

bee 10 conference

10th Business & Entrepreneurial Economics 2025

28th - 31st May - Dubrovnik - Croatia

CONFERENCE
PROCEEDINGS



Editors: Marko Kolaković, Ph.D., Ivan Turčić, Ph.D. & Tin Horvatinović, Ph.D.
Publisher: Student Business Incubator at the University of Zagreb

Under the auspices of the:
Croatian Chamber of Economy



Society of Friends of Dubrovnik Antiquities



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Impressum

Publisher:

Student Business Incubator at the University of Zagreb
Zagreb, Trg J. F. Kennedyja 6

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ISSN: 2459-5225

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THE GREATEST AMONG THE GREAT

Vladica Ristić¹

Abstract:

This paper highlights four of the greatest scientists, referred to as "*The Greatest Among the Great*", whose contributions have profoundly impacted human knowledge, scientific advancement, and philosophical thought. The selected scientists are Pythagoras, Archimedes, Muhammad ibn Musa al-Khwarizmi, Josip Ruđer Bošković (Ruggerio di Raguzio), and Benedikt Kotruljević -pioneers in numerous fields such as fluid mechanics, hydrotechnics, statics, geodesy, algebra, spherical geometry, mathematics, and quantum physics.

Pythagoras, an ancient mathematician, scientist, astronomer, and philosopher, founded the Pythagorean School a renowned philosophical, mathematical, mystical, and scientific society. Archimedes, - prominent mathematician, physicist, and astronomer of antiquity, is regarded as one of the greatest mathematical minds of all time, despite limited knowledge of his personal life.

Muhammad ibn Musa al-Khwarizmi, often known simply as al-Khwarizmi, was a polymath whose influential works in mathematics, astronomy, and geography, written in Arabic, shaped scientific thought for centuries. Josip Ruđer Bošković (Ruggerio di Raguzio) was a mathematician, astronomer, surveyor, physicist, and philosopher whose contributions significantly advanced scientific methodology.

Benedikt Kotruljević, a 15th-century merchant, economist, diplomat, and sailor from Dubrovnik, produced impactful economic theories that influenced the evolution of commercial and economic knowledge across Europe. This paper analyzes their invaluable contributions to science, innovation, and philosophy, emphasizing their influence on subsequent generations of scientists, innovators, and philosophers.

Keywords: Scientists, Innovators, Philosophers, Founders of New Sciences and Sub-sciences, Economist, Merchant, Sailor, Impact on Human Knowledge and Development.

INTRODUCTION

This paper explores the history of science by examining the lives and contributions of pivotal scientists. Understanding the origins of scientific thought requires a journey into the distant past, for the history of science is intrinsically linked to its future.

Why are they considered "*The Greatest Among the Great*"? Who deserves such a title, and what are the criteria for their selection? These are the questions this paper aims to address.

The term "*The Greatest Among the Great*" is used to highlight four scientists who, in my view, have played an instrumental role in shaping the world as we know it.

The scientists discussed are:

- **Pythagoras**
- **Archimedes**
- **Muhammad ibn Musa al-Khwarizmi**
- **Josip Ruđer Bošković**
- **Benedikt Kotruljević**

The selection criteria for these four prominent figures are based on:

- **Foundational Contributions:** Establishing new sciences and sub-sciences
- **Originality:** Creating innovative ideas and inventions later expanded by others
- **Methodology:** Pioneering approaches in scientific research and explanation
- **Application:** Practical implementation of their scientific discoveries
- **Legacy:** Their work marks pivotal points in scientific history—science is measured in time before and after them

This paper delves into their remarkable legacies and explores how their groundbreaking contributions continue to shape science, innovation, and human understanding to this day.

1. PYTHAGORAS – The visionary of numbers, harmony, and the cosmos

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Beyond the theorem

Pythagoras of Samos. A name that has echoed through the centuries as a synonym for mathematics was far more than the author of the famous theorem. He was a philosopher, mystic, musician, scientist, and visionary who saw numbers as the essence of the universe. His impact on science, philosophy, and art has left a lasting legacy that continues to shape our understanding of the world today.

The mysterious master of knowledge

Born around 570 BCE in Lebanon and later relocated to the island of Samos, Pythagoras displayed an insatiable curiosity and thirst for knowledge from an early age. He traveled the world, learning from Egyptian priests, Babylonian astrologers, and Indian sages. From each civilization, he collected fragments of knowledge, weaving them into a unique, unified system of thought.

His school in Croton was more than just an academy—it was a brotherhood devoted to the pursuit of truth, where science, philosophy, and spirituality merged into a single discipline.

The Pythagorean theorem – A foundation of geometry and beyond

The Pythagorean theorem, expressed as $a^2 + b^2 = c^2$, is often the first association with his name. Yet, for Pythagoras, this relationship between the sides of a right triangle was more than a geometric principle—it was proof of cosmic order and harmony.

Pythagoras believed that numbers were not mere symbols but the very essence of reality.

"All is number," he declared—a phrase that encapsulates his entire philosophy. By asserting that all natural phenomena could be expressed through numerical relationships, he laid the foundations not only for mathematics but also for music, astronomy, and physics.

The music of the spheres – When the cosmos sings

One of Pythagoras's most profound insights was the concept of the *"Music of the Spheres."* Observing the relationship between the lengths of strings and the sounds they produced, he discovered that harmonious musical notes corresponded to simple mathematical ratios.

From this, he concluded that the entire universe moved according to principles similar to musical harmony. He envisioned the planets as enormous spheres revolving around the center of the universe, producing an inaudible yet ever-present melody—the harmony of the spheres.

This concept, centuries later, would inspire Johannes Kepler in his study of planetary orbits.

Pythagorean geometry – The blueprint of the universe

Pythagoras was not merely a theorist—he was a visionary who perceived geometry as the key to understanding the cosmos. His school developed principles that became the bedrock of modern geometry:

- **Tetractys:** A sacred figure composed of ten points arranged in a triangular shape, symbolizing perfection and harmony. Pythagoreans swore their oaths upon it.
- **The Golden Ratio:** Although often attributed to later mathematicians, the concept of perfect proportions in nature has its roots in Pythagorean teachings.
- **The Sphere as the Perfect Form:** Pythagoras regarded the sphere as the most sublime shape, uniform in every direction, symbolizing eternity and perfection.

Numbers as the soul of the universe

For Pythagoras, numbers held character and meaning:

- **1 (Monad):** The origin of everything, representing unity and the divine.
- **2 (Dyad):** Duality—the clash of opposites such as light and darkness, male and female.
- **3 (Triad):** Perfection and balance—beginning, middle, and end.
- **4 (Tetractys):** Symbol of the universe and natural order.
- **10:** The number of completeness, the sum of the first four numbers (1+2+3+4).

Pythagoras saw numbers not only as the foundation of mathematics but also as a bridge between the material and the divine.

Pythagoras's contribution to science and civilization

Though many of his works have been lost, the impact of his ideas is indelible:

- **Foundations of Mathematics:** His followers contributed to algebra, geometry, and number theory.
- **Astronomy:** He proposed that the Earth was spherical and rotated on its axis—concepts accepted centuries later.
- **Medicine:** His teachings on balance and harmony influenced Hippocratic medicine and the theory of bodily humors.
- **Ethics and Philosophy:** His doctrines on the soul, reincarnation, and inner harmony inspired great philosophers, including Plato.

Pythagorean philosophy – Science as a path to truth

To Pythagoras, science was not merely knowledge but a path to enlightenment. His school was a place where intellect and spirit merged in the quest for higher understanding. His guiding principle was:

"Do not seek knowledge for gain, but for understanding."

Pythagorean philosophy united logic with intuition, reason with soul, and knowledge with faith—bridging science and spirituality, a connection that continues to inspire to this day.

Legacy – Pythagoras at the heart of science

Though over two millennia have passed, Pythagoras's spirit lives on in every mathematical formula, every musical harmony, and every scientific discovery. His vision of a universe ordered, mathematically structured, and harmoniously connected remains one of the most powerful concepts in the history of human thought.

Pythagoras was more than a man—he was a vision of what humanity can achieve when mind, soul, and heart unite in the search for truth.

2. ARCHIMEDES – Master of knowledge, pioneer of science, and father of engineering

The man who understood the universe in a drop of water

Archimedes of Syracuse. In old literature, there is a mention of **Mihailo Median – the Mediterranean man**, hence the part "**MED**", where, in a literal translation, his name would mean "**Old Median**". However, a name that symbolizes the genius who understood the world before the world understood itself. His discoveries were more than formulas and mechanical devices and they were reflections of human passion for truth. His mind united philosophy, mathematics, and practice, building a bridge between theory and application, science and wonder.

A genius who understood nature before nature understood itself

Born around 287 BCE in Syracuse, a city on the coast of Sicily, Archimedes was the son of the astronomer Phidias. His childhood was illuminated by stars, numbers, and the sea—the very sea that would later become the stage for his greatest experiments. He was educated in Alexandria, the intellectual capital of the ancient world, where he became friends with the greatest minds of his time.

Yet, Archimedes was more than a scientist—he was a creator, an explorer, and a poet in the world of numbers. His love for knowledge was pure and boundless. Even when he was found dead during the defense of Syracuse, his final words were:

"Do not disturb my circles!" (Noli turbare circulos meos)—because within those circles, there was more life than in entire empires.

Archimedes – Master of geometry and pioneer of numbers

Geometry was Archimedes' greatest passion—a language of the universe, a code that unlocked nature's secrets. His most renowned contributions to geometry include:

- **The first calculation of Pi (π):** Archimedes was the first to estimate that π lies between 3.1408 and 3.1429 using the method of inscribed and circumscribed polygons. His approximation method was a marvel of logic and precision.
- **Volume and surface area of a sphere:** He was the first to determine the relationship between the volume and surface area of a sphere and a cylinder. He was so proud of this discovery that he requested a sphere and a cylinder to be engraved on his tombstone.

- **Quadrature of the parabola:** Archimedes demonstrated how the area of a parabolic segment could be calculated through the sum of an infinite series of triangles—a method that foreshadowed integral calculus centuries before Newton and Leibniz.

Eureka! – Archimedes and the secret of water

Legend has it that Archimedes discovered his famous principle while bathing. Observing how water rose as he entered the tub, he realized a truth that would change the world:

“A body immersed in a fluid displaces a volume of fluid equal to the weight of the body.”

Overwhelmed with excitement, he ran out of the bath, shouting *“Eureka!”* (“I have found it!”). But Archimedes’ principle was more than a solution for the king’s crown—it became the key to understanding buoyancy, ships’ flotation, hot air balloons, and the behavior of all bodies in liquids and gases.

Master of machines – When science becomes power

Archimedes not only discovered natural laws—he applied them to create incredible machines. His inventions were ahead of their time and have served as models for engineers throughout history:

- **Archimedes screw:** A brilliant device for raising water, still used today in agriculture and sewage systems.
- **The lever and the fulcrum:** It was Archimedes who famously said: *“Give me a place to stand, and I will move the Earth.”*

His principles of mechanics laid the foundation for modern physics.

- **War machines:** He designed catapults, cranes, and even the legendary *“death mirrors”* that, according to legend, set Roman ships ablaze by reflecting sunlight.

Archimedes and the dawn of scientific methodology

Archimedes was more than an inventor—he was a thinker who asked questions, sought answers, and documented his methods. In his work *“The Method,”* he described how he used physics to solve geometric problems—a technique that would later form the basis of the scientific method.

Three key contributions of archimedes to human knowledge

- **Understanding nature through mathematics:** His calculation techniques were the earliest steps toward the development of integral and differential calculus.
- **Connecting theory with practice:** His inventions proved that knowledge is power—not power over people, but power over nature.
- **A passion for truth:** His scientific journey was driven by a love for understanding, not by a thirst for fame or wealth.

The legacy of Archimedes – From antiquity to the stars

The influence of Archimedes transcends time:

- **Isaac Newton** studied Archimedes’ methods while developing the laws of gravity.
- **Galileo Galilei** built upon his principles in his experiments with gravity and motion.
- **NASA** named a crater on the Moon after Archimedes—a tribute to a man whose mind reached beyond the stars.

Archimedes – The man who saw the invisible

Archimedes was not only a genius—he was a bridge between what is and what could be. He proved that within a simple drop of water lies the law of the universe, and within a single circle—the mystery of infinity.

His life teaches us that true science is not in formulas but in the passion to understand the world. His death reminds us that the most valuable circles are those we leave behind in knowledge and memory.

And so, as long as humanity seeks truth, Archimedes will live on—in every circle, every formula, and every triumphant cry of: *“Eureka!”*

3. AL-KHWARIZMI – Father of algebra, architect of numbers, and visionary of the mathematical future

The man who built the foundations of modern computation

Abu Abdullah Muhammad ibn Musa al-Khwarizmi—a name that echoes through the centuries as a synonym for numbers, algorithms, and mathematical logic. Born in the 9th century, during the golden age of Islamic civilization, Al-Khwarizmi was not only a mathematician—he was a visionary whose ideas became the foundation of the digital world we know today. His name gave rise to the term *algorithm*, and his works formed a bridge between ancient wisdom and the modern world of computing.

The journey of a stellar mind: the life of Al-khwarizmi

Al-Khwarizmi was born around 780 CE in Khwarazm (modern-day Uzbekistan), during an era when Baghdad was the global hub of knowledge and science. His intellect blossomed under the auspices of the **House of Wisdom (Bayt al-Hikma)**, an institution established by the Abbasid caliph Al-Ma'mun. In this pioneering center of learning—where works from Greek philosophers to Indian mathematicians were translated and studied—Al-Khwarizmi produced writings that would reshape the course of science.

Algebra – The science that changed the world

Al-Khwarizmi laid the foundations of what we now call algebra. His groundbreaking work, *Kitab al-Mukhtasar fi Hisab al-Jabr wal-Muqabala (The Compendious Book on Calculation by Completion and Balancing)*, became the cornerstone of a new branch of mathematics.

What is Al-Jabr?

The term *al-jabr*, from which the word *algebra* originates, means "completion" or "restoration," referring to the process of transposing subtracted quantities from one side of an equation to the other. This method was pivotal in solving linear and quadratic equations.

The first guide to practical mathematics

In his book, Al-Khwarizmi explained:

- **Solving linear and quadratic equations** through simple, logical steps.
- **Concepts of roots and squares** essential for understanding equations.
- **Practical applications** of mathematics—from inheritance laws to land measurement.

His Revolutionary Approach to Quadratic Equations:

Using methods that predated modern algebraic notation, he demonstrated solutions for equations such as:

- $ax^2 + bx = c$
- $ax^2 = bx + c$
- $bx = ax^2 - c$

Al-Khwarizmi wrote not only for scholars—his work served as a practical guide for merchants, surveyors, and lawmakers. His approach transformed mathematics into a tool for everyday life.

Algorithms – The language of the modern age

The term *algorithm* derives from Al-Khwarizmi's Latinized name (*Algoritmi*), signifying a systematic, step-by-step procedure for solving problems.

How algorithms became the core of technology

Today, algorithms power every aspect of the digital world:

- **Search engines (e.g., Google):** Each query is resolved using complex algorithms.

- **Cryptocurrencies (Blockchain):** Built on mathematical algorithms for security and transparency.
- **Artificial intelligence (AI):** Relies on algorithms for learning, prediction, and decision-making.

If the modern digital world is a machine, then Al-Khwarizmi was its first engineer.

Decimal numbers and the Indian numbering system

Al-Khwarizmi introduced the Indian numeral system to Europe—the system we now call *Arabic numerals* (0, 1, 2, 3, 4...). His work *Kitab al-Hisab al-Hindi (The Book of Indian Calculation)* introduced the use of the digit zero (0), a concept without which modern computing would be impossible.

Zero – The most powerful number that means nothing

Al-Khwarizmi demonstrated that zero was more than just an empty placeholder—it was fundamental to:

- **The decimal system:** The difference between 10 and 100 is the placement of zero.
- **Binary code:** The language of computers, which relies solely on 0s and 1s.

Trigonometry, Astronomy, and Cartography

Al-Khwarizmi was not only a mathematician—he was also an astronomer and cartographer. His trigonometric tables, based on sine values, became essential for advancements in astronomy and navigation.

The first world map

At the request of Caliph Al-Ma'mun, Al-Khwarizmi created one of the earliest maps of the known world, using precise geographic coordinates. This map corrected Greek errors in measuring the Earth's circumference and provided a more accurate understanding of the distances between continents. His work became a foundation for later European cartographers.

Al-Khwarizmi's works – Pillars of scientific knowledge

- **Kitab al-Mukhtasar fi Hisab al-Jabr wal-Muqabala:** The foundation of algebra.
- **Kitab al-Hisab al-Hindi:** On the decimal number system and zero.
- **Zij al-Sindhind:** Astronomical tables based on Indian mathematics.
- **Kitab Surat al-Ard:** A geographical guide and one of the earliest world maps.

Al-Khwarizmi's impact on the world:

- **In Europe:** His works were translated into Latin under titles like *Algoritmi de numero Indorum* ("The Algorithm of the Numbers of the Indians"), giving rise to the word *algorithm*.
- **For Mathematicians:** His equation-solving methods laid the groundwork for analytic geometry and calculus.
- **For the Digital World:** Without his contributions, modern computers, smartphones, and digital systems would not exist.

The three greatest contributions of Al-Khwarizmi to civilization:

1. **Algebra as the Universal Language of Science:** Forming the backbone of mathematics, physics, and technology.
2. **Algorithms – The Heart of the Modern Digital World:** Powering everything from search engines to cryptography.
3. **The Decimal System and the Introduction of Zero:** Laying the foundation for modern computing and binary code.

Al-Khwarizmi – The eternal visionary

Al-Khwarizmi did not simply change the way we calculate and, he transformed the way we think. His algebra was more than a science of numbers; it was a science of patterns, problem-solving, and logic. His algorithms were more than computational procedures—they became the essence of every modern computer program. His legacy is not confined to books; it lives in every digital device, every search query, and every formula that pushes the boundaries of knowledge.

Al-Khwarizmi taught us that **knowledge is power**, not power over others, but power over the unknown. And as long as the world of algorithms exists, the spirit of Al-Khwarizmi will endure, an eternal guide through the infinite universe of knowledge.

4. JOSIP RUĐER BOŠKOVIĆ – A scientist ahead of his time, prophet of atomism, and builder of bridges between science and philosophy

The man who saw through the eyes of atoms

Josip Ruđer Bošković—an enduring symbol of genius whose intellect united mathematics, physics, astronomy, and philosophy into a timeless body of work. Born in Dubrovnik in 1711, during an era when tradition defined the boundaries of knowledge, Bošković shattered those boundaries and heralded the dawn of modern science. His theory of forces and invisible points foreshadowed principles that would be confirmed centuries later in quantum physics.

Bošković's legacy lies not only in books—it is embedded in the foundations of the scientific method, in every experiment, and in every formula that seeks to unravel the mysteries of the universe.

A journey of the mind: The life of Ruđer Bošković

Ruđer Bošković was born in 1711 in Dubrovnik to the family of merchant Nikola Bošković and Paola Bettera. From an early age, his education was marked by insatiable curiosity. At the age of 14, he moved to Rome and enrolled at the Jesuit **Collegium Romanum**, where he soon became a professor of mathematics. However, his intellectual pursuits knew no boundaries—he explored astronomy, geodesy, optics, mechanics, and philosophy. Bošković's life was a blend of scientific exploration and diplomatic missions. He constructed optical instruments, participated in geodetic surveys, resolved disputes over hydraulic projects, and left an indelible mark on the history of science.

"Theoria philosophiae naturalis" – The manifesto of modern science

Bošković's magnum opus, *"Theoria Philosophiae Naturalis redacta ad unicam legem virium in natura existentium"* (*A Theory of Natural Philosophy Reduced to a Single Law of Forces Acting in Nature*), published in 1758, is regarded as one of the most significant scientific works of the 18th century.

A revolutionary theory of forces and points

In his *Theoria*, Bošković proposed a model of the universe based on point-like particles and forces acting between them—a radical departure from the Newtonian mechanical view of the world:

- The universe consists of dimensionless point particles.
- Attractive and repulsive forces between particles depend on their distance.
- At extremely short distances, repulsive forces prevent particles from colliding (*a precursor to the concept of quantum repulsion*).
- At greater distances, attractive forces operate, similar to gravity.

A visionary of quantum physics and field theory

What makes Bošković a true visionary is that, centuries before the discovery of atoms and quantum physics, he foresaw that matter was not continuous but composed of invisible, point-like entities interacting through forces. His ideas influenced some of the greatest physicists:

- **Michael Faraday** – in developing the theory of fields.
- **James Clerk Maxwell** – in formulating electromagnetic theory.
- **Werner Heisenberg** – in advancing quantum mechanics.

Astronomical achievements: Bošković and his gaze toward the stars

Bošković not only theorized invisible forces but also observed the visible universe. His contributions to astronomy were remarkable:

- **Sunspots:** He was the first to explain the nature of sunspots, identifying them as phenomena on the Sun's surface.

- **Precession of the earth's axis:** He contributed to understanding calendar irregularities through his research on axial precession.
- **Astronomical instruments:** He constructed refractors and micrometers for precise astronomical observations.
- **Transit of Venus (1761):** His observations of Venus's transit contributed to measuring the distance between the Earth and the Sun (the astronomical unit).

Geodesy and cartography: Measuring the earth

Bošković was one of the first scientists to apply mathematics to geodesy. His pioneering work on measuring the Earth's meridian between Rome and Rimini in 1750 laid the groundwork for accurately determining the Earth's shape:

- **Method of Least Squares:** He developed a method for processing measurement results—a precursor to modern statistical analysis and regression models.
- **Geometry and Astronomy:** He connected geometry with astronomy, establishing the foundations of modern cartography.

Contributions to optics and the theory of light

Bošković investigated the nature of light, working on theories of colors and double refraction. His experiments advanced the development of optical instruments:

- **Microscopes and telescopes:** He improved the precision of scientific instruments, advancing the theory behind them.
- **Interference of light:** His studies laid the groundwork for understanding light interference, crucial for the later development of quantum optics.

Philosophy of science: Scientist and thinker

Bošković was not only an experimenter but also a philosopher of science. In his theory of continuity, he argued that nature knows no discontinuities or sudden jumps—a viewpoint that would later spark debates in quantum physics.

His Philosophical Principles:

- Science must be guided by both experiment and reason.
- Force and matter are inseparable—one cannot exist without the other.
- The universe is a harmonious system governed by laws comprehensible through mathematics.

The works of Ruder Bošković:

- **Theoria Philosophiae Naturalis (1758):** His magnum opus on natural laws.
- **De Solis et Lunae Defectibus:** A treatise on solar and lunar eclipses.
- **De Viribus Vivis:** A discourse on forces in nature.
- **Opera Pertinentia ad Opticam et Astronomiam:** Works on optics and astronomy.

The legacy of Ruder Bošković:

- **Field Theory:** His theory of forces influenced the development of modern physics.
- **Method of Least Squares:** Became the basis for statistical data analysis.
- **Contributions to Astronomy and Geodesy:** His measurements and observations laid the groundwork for modern scientific disciplines.

The four key contributions of Ruder Bošković to civilization:

1. **Unified Theory of Forces:** A precursor to quantum physics and field theory.
2. **Advancement of Mechanics:** A pioneer in the science of statics.
3. **Applied Mathematics in Geodesy:** The foundation of modern measurements and statistical methods.
4. **Contributions to Astronomy and Optics:** Advancements in observational sciences.

Ruđer Bošković – A timeless visionary

Ruđer Bošković was more than a scientist he was a prophet of science. His vision of the universe as a network of invisible forces laid the groundwork for theories that today explain atoms, quantum particles, and dark matter. His intellect bridged classical and modern science—philosophy and physics, past and future.

As long as there are those who explore the mysteries of the universe and the invisible forces that govern it, the spirit of Ruđer Bošković will remain a timeless beacon of science and reason.

Bošković's contributions to relativity, atomic theory, and electrodynamics:

- **Theory of relativity:** 115 years before Einstein, Bošković laid the groundwork for the theory of relativity and established the speed of light as a constant (c).
- **Atomic model:** He introduced the law of forces responsible for electron behavior—repulsive forces at short distances and attraction at long distances—a concept later expanded by Michael Faraday.
- **Bošković's field theory:** Positioned the atom as a central point surrounded by fields of attractive and repulsive forces (*Bošković's Field*).
- **Electrodynamics:** In his works stored in the Vatican, Bošković described experiments with direct and alternating current 120 years before Nikola Tesla.

Ruđer Bošković's legacy is immortal. His theories transcend time, and his ideas resonate in every field of science, from quantum mechanics to astronomy. He was not only a scientist but a visionary whose ideas continue to guide humanity's search for truth.

The spirit of Ruđer Bošković lives on forever illuminating the path through the infinite universe of knowledge.

5. BENEDIKT KOTRULJEVIĆ – The pioneer of economics and maritime trade

Benedikt Kotruljević (*Benediktus de Cotrullis*, 1416–1469) was a merchant, economist, diplomat, sailor, and writer from Dubrovnik whose work left a profound and lasting mark on European economic, commercial, and accounting history. His name holds an important place among the pioneers of modern economics, and his treatise "*On Trade and the Perfect Merchant*" (*Della mercatura e del mercante perfetto*) is regarded as one of the first European texts on economics. In addition, his writings on maritime trade, bookkeeping, and business ethics continue to be studied as foundational principles of commerce and professional conduct.

Life and historical context

Benedikt Kotruljević was born in 1416 in Dubrovnik, one of the most powerful and affluent maritime republics on the Adriatic. Dubrovnik, with its strong commercial ties and highly developed social system, was an ideal environment for cultivating intellectuals and merchants. Coming from a distinguished Dubrovnik family, Benedikt received a quality education focusing on law, commerce, mathematics, and economics.

From a young age, he displayed a strong curiosity and aptitude for practical knowledge. He began traveling early, visiting numerous Mediterranean ports—Venice, Naples, Genoa, and Barcelona—where he gained valuable trading experience and learned about accounting and maritime law. Dubrovnik, as a key trading hub between East and West, enabled him to advance swiftly in the world of commerce.

Kotruljević also had a notable diplomatic career. As a representative of the Republic of Dubrovnik, he participated in negotiations and the establishment of trade agreements with various states. He was a pragmatist and a humanist believing that trade should not only be a means of acquiring wealth but also a path to building a better and fairer society.

"On trade and the perfect merchant" – The first manual on economics and accounting

Benedikt Kotruljević's most important work is "*On Trade and the Perfect Merchant*" (*Della mercatura e del mercante perfetto*), written in 1458. Although it was published posthumously in 1573 in Venice, this book stands as one of the earliest works in European literature dealing with economics, accounting, and business ethics.

In this work, Kotruljević argued that trade is not merely the art of making a profit but also a social necessity. He believed that a merchant should possess not only knowledge and skills but also moral virtues such as honesty, wisdom, and temperance.

Key themes of the work:

- **The role of the merchant:** Kotruljević saw merchants as more than just economic agents; they were guardians of social values. He wrote that a merchant should be educated, honest, and responsible to the community.
- **Double-entry bookkeeping:** He was the first in European literature to describe the double-entry bookkeeping system, predating Luca Pacioli, who wrote about it in 1494. He explained the principle that *“every transaction has two records – debit and credit.”*
- **Morality and ethics in trade:** According to Kotruljević, trade was not just a business but a calling that required ethical behavior, respect for contracts, and fulfillment of obligations.
- **The importance of record-keeping:** He emphasized that proper bookkeeping was not only a matter of order but also a means to ensure trust and success in business.
- **The role of money:** He believed that money should be a medium of exchange, not an end in itself. He condemned greed and speculation, advocating for fair trading practices.

Benedikt Kotruljević and accounting – The first business manual

One of Kotruljević's most significant contributions was his explanation of double-entry bookkeeping (*double-entry accounting*), which, at the time, was little known outside merchant circles. His method laid the groundwork for modern accounting. In his book, Kotruljević explained:

- **Debits and credits:** Every business transaction should be recorded twice—once as a debit and once as a credit.
- **The ledger:** He advocated for maintaining a general ledger, subsidiary ledgers, and a cash journal.
- **The balance sheet:** He described how merchants should maintain records of assets, liabilities, and capital.

Although Luca Pacioli would later gain fame for his treatise on accounting, Kotruljević described these principles decades earlier. Despite being overlooked for centuries, modern researchers now recognize him as a true pioneer of bookkeeping and accounting practices.

"On Navigation" – The first maritime manual from the Balkans

In addition to writing about commerce, Kotruljević was a passionate sailor. His work *"On Navigation" (De Navigazione)* is one of the oldest European treatises on maritime affairs. In it, he discussed:

- **Maritime routes and navigation:** He explained how to use the compass, stars, and wind roses for determining direction.
- **Organization of the ship's crew:** He described the hierarchy on board and the responsibilities of the captain, sailors, and ship clerks.
- **Keeping a ship's log:** He considered the ship's log essential for safe navigation and business operations.
- **Maritime law:** He addressed important topics such as cargo insurance, the captain's responsibilities, and dispute resolution.

This work is valuable because it captures an era when maritime trade was the backbone of commerce and economic development, with Dubrovnik being one of the most important trading centers in the Mediterranean.

Benedikt Kotruljević as a philosopher of trade and ethics

Kotruljević was not only a practitioner—he was also a thinker. His writings are filled with philosophical reflections on the role of trade in society. He believed that commerce was not only the exchange of goods but also the exchange of knowledge, culture, and values.

His perspective on wealth was moderate:

“Wealth is useful only if managed wisely and with moderation. A true merchant does not trade out of greed but for the common good.”

He argued that a merchant should be educated not only in accounting but also in languages, law, mathematics, and rhetoric. His ideal merchant was *“a person of integrity, well-educated and honest, willing to honor contracts and contribute to the community.”*

The influence of benedikt kotruljević on economic history

Although his work was recognized only posthumously, Kotruljević's impact was profound:

- **In economics:** His ideas on bookkeeping became the foundation for the development of modern accounting.
- **In commerce:** His ethical approach to business set standards for professional conduct still taught in business schools today.
- **In maritime trade:** His insights on navigation and ship management were valuable to sailors for centuries after his death.

Legacy and recognition

Today, Benedikt Kotruljević is regarded as one of the greatest minds the Balkans has contributed to the world. Streets, schools, and institutes bear his name, and his works are studied as part of cultural and economic heritage. In his hometown of Dubrovnik, his name endures as a symbol of intellectual curiosity, business integrity, and visionary thinking. His writings have been translated and analyzed worldwide, and economic scholars recognize him as one of the foremost predecessors of modern economics.

Legacy and impact

Benedikt Kotruljević was not only a merchant, economist, and sailor, he was a visionary, philosopher, and teacher for future generations. His works remind us that economics is more than numbers, that trade is more than the exchange of goods, it is the exchange of values, and that true success stems from knowledge, honesty, and responsibility to the community.

As a pioneer of accounting, maritime trade, and business ethics, Kotruljević has left the world with timeless contributions—works, ideas, and values that remain as vital today as they were in his time. His story stands as an eternal reminder that knowledge, effort, and integrity are the cornerstones of every success.

Benedikt Kotruljević left an indelible mark on the history of global economics, trade, and maritime affairs. His concepts of bookkeeping laid the foundation for modern accounting practices, and his vision of trade as a blend of ethics, knowledge, and skill continues to inspire.

Although his contributions were recognized long after his death, he is now considered one of the most important predecessors of modern economics. In his native Dubrovnik and beyond, his name is honored as a synonym for vision, innovation, and pioneering economic thought.

Benedikt Kotruljević was more than a merchant and economist; he was a thinker, a humanist, and a visionary. His works form a bridge between medieval commercial practice and the Renaissance view of economics as a science. His message on the importance of honesty, knowledge, and diligence in trade still resonates as a timeless truth.

Through his books, he did not simply write about economics, he wrote the rules that form the foundations of modern business practice. As a pioneer of economic and maritime knowledge, Benedikt Kotruljević rightfully deserves a distinguished place in the history of human thought.

FINAL THOUGHT

The greatest among the greats – timeless visionaries who shaped humanity's future

The legacies of Pythagoras, Archimedes, Al-Khwarizmi, Bošković, and Kotruljević stand as monumental pillars of human progress—proof that the pursuit of knowledge transcends time, borders, and disciplines. Each of these pioneers, through their unique contributions, not only advanced science and thought but also redefined how humanity perceives the universe, nature, and society.

Pythagoras, the philosopher of numbers, saw mathematics as the language of the cosmos. His exploration of numbers, harmony, and geometric relationships laid the groundwork for disciplines far beyond mathematics—from music theory to modern physics. His concept of the *Music of the Spheres* reminds us that science and art are deeply intertwined, and his theorem remains a cornerstone of geometry, symbolizing order and structure in both nature and thought.

Archimedes, the master of knowledge and invention, embodied the essence of applied science. His principle of buoyancy and mastery of geometry revolutionized mathematics and physics, while his ingenious machines demonstrated the transformative power of scientific understanding. From the lever to the Archimedean screw, his inventions bridged theory and practice, proving that science can solve real-world problems and drive technological progress. His passionate cry, "*Eureka!*", remains a timeless symbol of discovery driven by curiosity and wonder.

Al-Khwarizmi, the father of algebra and algorithms, constructed the very framework upon which modern computation stands. By developing algebra and introducing the decimal number system and zero to the West, he reshaped mathematics into a universal tool for problem-solving. His concept of the algorithm—a step-by-step

method for solving problems—is now the backbone of computer science, powering everything from search engines to artificial intelligence. His work bridges ancient wisdom with the digital future, proving that knowledge, once discovered, continues to evolve and expand.

Josip Ruđer Bošković, the prophet of atomism and precursor of modern physics, envisioned a universe governed by invisible forces—centuries before the birth of quantum physics. His unified theory of forces and the concept of point particles anticipated the discoveries of fields, atomic structures, and the principles of relativity. Beyond theory, he transformed practical sciences such as geodesy and optics, connecting mathematics, astronomy, and philosophy. Bošković was not only a scientist but a philosopher, reminding us that the search for truth is both logical and spiritual.

Benedikt Kotruljević, the pioneer of economics and maritime knowledge, recognized that commerce is more than the exchange of goods—it is the exchange of trust, knowledge, and values. His early treatise on double-entry bookkeeping, written decades before Luca Pacioli's famed work, laid the foundation for modern accounting practices. Beyond numbers, he advocated for business ethics, fairness, and the importance of education in trade. His book on navigation preserved centuries of maritime wisdom, bridging commerce, exploration, and technological advancement.

A shared legacy: Bridging the past with the future

Though they lived in different eras and pursued different fields, these visionaries share a common legacy—they built bridges between knowledge and humanity, between theory and practice, and between the past and the future. Their discoveries were not isolated flashes of brilliance; they were part of a continuous journey of exploration that shaped civilizations, advanced technologies, and redefined human potential.

Their contributions extend far beyond their lifetimes:

- Pythagoras's numbers pulse through the algorithms that power modern computing.
- Archimedes's principles guide engineers in designing everything from bridges to spacecraft.
- Al-Khwarizmi's algorithms are embedded in every digital device, from smartphones to AI systems.
- Bošković's theories of matter resonate in quantum physics and particle science.
- Kotruljević's vision of commerce lives in every ledger, bank, and global trade network.

Timeless inspiration for humanity's next chapter

These pioneers remind us that knowledge is not an end, it is a journey. Their lives teach us that science, mathematics, philosophy, and commerce are not isolated fields but interconnected pathways toward understanding the world and improving it. Their stories show that true greatness is not only measured

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EVOLUTION OF INNOVATION MANAGEMENT – CASE STUDY

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Abstract:

This case study explores the development and outcomes of the Oulu Innovation Alliance (OIA) between 2009 and 2024. The research methodology combines document analysis, monitoring methods, and the application of artificial intelligence. The data sources include surveys conducted at various stages, thematic interviews with key stakeholders, and comprehensive project documentation. Artificial intelligence tools were employed during data analysis to enhance pattern recognition and support qualitative content analysis, thereby generating deeper insights into the evolution of innovation management practices within the OIA framework in Northern Ostrobothnia, Finland.

The primary objective of the study is to examine the progression of innovation management in the Northern Ostrobothnia region, using the OIA as a focal case through which broader regional innovation dynamics are explored and contextualized. The core of a well-functioning OIA lies in dynamic collaboration between among various participants including business, research institutions, government agencies and end-users. OIA promotes ongoing learning, creativity, and joint development, ultimately driving sustainable and meaningful innovation efforts. OIA fosters an innovation ecosystem that integrates a business-driven ecosystem with a research-oriented knowledge ecosystem. In the context of the green transition, regional competitiveness is increasingly based on the development of cooperative and collaborative capabilities.

Establishing a strong foundation grounded in shared commitment and unified objectives promotes stability in times of change. Nevertheless, success also hinges on the willingness to adopt novel approaches and to do things differently. Such adaptability enables stakeholders to manage uncertainties and capitalize on emerging opportunities, thus fostering a sustainable and resilient innovation ecosystem. Key takeaways emphasize the significance of cultivating an open and inclusive innovation environment, where collaboration among diverse stakeholders accelerates development.

Keywords: Innovation Management, business- and research-driven ecosystems, innovation ecosystems

INTRODUCTION

The concept of innovation ecosystems has emerged as a crucial framework for understanding the mechanisms through which innovation is initiated and evolves within interconnected networks of actors. This framework is particularly pertinent in addressing complex global challenges, as it offers insights into the structures, relationships, and resources essential for fostering innovation. By providing a systematic approach to analyzing these ecosystems, the theoretical framework assists a wide array of stakeholders—including policymakers, industry leaders, and academic institutions in formulating strategies that enhance collaborative value creation.

Innovation ecosystems are commonly defined as dynamic networks composed of diverse actors, such as businesses, universities, research institutions, government agencies, and non-profit organizations, collectively working to drive innovation (Granstrand & Holgersson, 2020). These ecosystems emphasize co-creation, shared value, and synergies, rendering them essential for the development and diffusion of novel solutions (Adner, 2017). Within this context, the framework facilitates a deeper understanding of the roles of various actors, the nature of their interactions, and the key resources that enable ecosystem performance.

At the core of the innovation ecosystem framework lie three fundamental components: actors, relationships, and resources. Actors including startups, large corporations, and academic institutions bring complementary capabilities, ranging from agility and creativity to substantial expertise and market access (Etzkowitz & Leydesdorff, 2000). The relationships between these actors, shaped by trust, collaboration, and network dynamics, are critical in enabling knowledge exchange and co-innovation (Nahapiet & Ghoshal, 1998). Moreover, the accessibility and adequacy of financial, intellectual, and technological resources significantly influence the ecosystem's capacity for innovation (Porter, 1998).

Several theoretical perspectives enrich this framework. The Triple Helix model underscores the interactive dynamics among academia, industry, and government (Etzkowitz & Leydesdorff, 2000); the open innovation paradigm highlights the strategic importance of external knowledge flows (Chesbrough, 2003); and systems theory provides a lens to examine feedback mechanisms and complex interdependencies within the ecosystem.

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(Forrester, 1961). These theoretical contributions not only clarify the structural and functional dimensions of innovation ecosystems but also address operational challenges such as boundary delineation, power asymmetries, and inclusivity (Adner & Kapoor, 2010).

This introductory framework highlights the necessity of a robust theoretical foundation for understanding innovation ecosystems. By accounting for the dynamic and context-dependent nature of these ecosystems, the framework offers a platform for enhancing collaboration, building resilience, and addressing societal needs in an increasingly complex and rapidly changing environment. The present study contributes to this discourse by investigating the evolution of innovation management in Northern Ostrobothnia, Finland, through the case of the Oulu Innovation Alliance (OIA). OIA constitutes an innovation ecosystem that integrates a business-oriented business ecosystem with a research-driven knowledge ecosystem, underpinned by active collaboration at both national and international levels. In this context, the region's competitiveness is rooted in the capacity to develop and maintain collaborative capabilities.

This case study examines the progression and outcomes of OIA from 2009 to 2024. The research methodology applied includes document analysis, monitoring tools, and the utilization of artificial intelligence. The primary aim of this study is to provide insight into the development of innovation management in Northern Ostrobothnia by analyzing the evolution of OIA. Need-based regional ecosystems function as dynamic constructs tailored to support the development of expertise, technological innovation, and business growth. These ecosystems are designed to meet specific regional demands by leveraging local resources, talent, and industrial strengths to create a synergistic operating environment. Competence platforms and growth ecosystems foster cooperation and co-creation across firms of varying sizes, educational and research institutions, the public sector, and end users. In the context of the green transition, regional competitiveness increasingly relies on strengthening collaboration and the capacity for joint development.

THEORETICAL FRAMEWORK IN INNOVATION ECOSYSTEMS

The concept of innovation ecosystems has garnered significant scholarly attention in recent years, particularly as a critical enabler for innovation and a means to advance sustainable development goals. A comprehensive theoretical framework is essential for understanding the mechanisms, actors, and processes that underpin these ecosystems. Furthermore, such a framework facilitates the design of policies and strategies that fully harness the potential of innovation ecosystems.

Defining Innovation Ecosystems

An innovation ecosystem can be defined as a dynamic and interconnected network of organizations and individuals—including firms, universities, research institutes, government bodies, and other stakeholders—that collaborate to promote innovation (Granstrand & Holgersson, 2020; Liu et al., 2024). Central to this concept are co-creation, shared value, and synergistic relationships that support the development and diffusion of innovations (Adner, 2017).

Core Components of the Framework

A robust theoretical framework typically emphasizes three fundamental components: actors, relationships, and resources. **Actors and Roles:** Innovation ecosystems involve a range of entities with complementary capabilities. Startups often contribute agility and risk-taking, whereas large firms provide scale, resources, and market access. Universities and research institutions act as hubs of knowledge creation and technological advancement (Etzkowitz & Leydesdorff, 2000). **Relationships and Networks:** Effective collaboration and interaction among actors are critical to ecosystem functioning. The strength and quality of these relationships affect the flow of knowledge, resources, and trust. Social capital theory, as articulated by Nahapiet and Ghoshal (1998), underscores the importance of trust-based networks for knowledge sharing and innovation. **Resources and Infrastructure:** Access to financial capital, intellectual property, and technological infrastructure determines the ecosystem's innovation capacity (Porter, 1998). The regional innovation systems perspective further highlights the role of localized infrastructure in supporting innovation (Cooke et al., 2004).

Theoretical Perspectives

Several theoretical models enrich the understanding of innovation ecosystems: **Triple Helix Model:** Emphasizes the synergetic interaction between academia, industry, and government as drivers of innovation. Overlapping roles among these sectors can generate hybrid institutions and enhance innovation capacity (Etzkowitz &

Leydesdorff, 2000). **Open Innovation Paradigm:** According to Chesbrough (2003), firms can enhance their innovation outcomes by incorporating external knowledge sources and engaging in collaborative practices. **System Dynamics:** Systems theory offers a macro-level lens for examining feedback loops, interdependencies, and emergent properties in innovation ecosystems (Forrester, 1961).

Challenges in Operationalization

Despite its conceptual strength, the innovation ecosystem framework faces challenges in practical implementation. One prominent issue is the difficulty in delineating ecosystem boundaries, as interactions frequently transcend geographic and sectoral limits (Jacobides et al., 2018). Additionally, power asymmetries among stakeholders can inhibit equitable value distribution and undermine long-term sustainability (Adner & Kapoor, 2010). Nevertheless, the theoretical framework remains indispensable for analyzing and optimizing the interplay of actors, resources, and relationships. Grounding policy and practice in these theoretical insights can support the creation of resilient, high-performing ecosystems. Further research is needed to address conceptual limitations and enhance framework applicability across diverse regional and sectoral contexts. Moreover, extending the framework to account for broader societal transformations and contextual variables such as institutional, cultural, and geographic conditions is essential.

Evolution and Dynamics of Innovation Ecosystems

Innovation ecosystems are inherently dynamic, evolving over time as new actors emerge, technologies advance, and societal needs evolve. Evolutionary economic theory, particularly the work of Nelson and Winter (1982), provides a useful foundation for understanding adaptation through processes of variation, selection, and retention. The introduction of disruptive technologies can alter ecosystem boundaries and necessitate new roles and collaborative arrangements (Christensen, 1997). Similarly, the adaptive cycle framework from systems ecology comprising growth, conservation, release, and reorganization offers a lens through which to understand ecosystem resilience amidst shocks and transformations (Holling, 2001).

Contextual Factors and Place-Based Ecosystems

The effectiveness of an innovation ecosystem is significantly shaped by contextual factors, including geographic location, institutional frameworks, and cultural values. Regional innovation systems (RIS) theory emphasizes the role of proximity, localized knowledge spillovers, and embedded networks in promoting innovation (Cooke et al., 2004). For example, Silicon Valley thrives due to its confluence of venture capital, a risk-taking culture, and the presence of leading academic and industrial institutions. Cultural dimensions, as identified by Hofstede (1980), also influence ecosystem dynamics; for instance, collectivist societies may favor long-term trust-based relationships, while individualist cultures might prioritize competitive, fast-paced innovation.

Inclusivity and Equity

Inclusivity is increasingly recognized as a critical dimension in innovation ecosystems. Traditional models often overlook the perspectives of marginalized groups, including small enterprises, non-profits, and underrepresented communities. Inclusive innovation theory seeks to correct this oversight by promoting equitable access to resources, participation, and benefits (George et al., 2012). Fostering inclusivity not only enhances social equity but also enriches the ecosystem with diverse viewpoints and novel ideas, thereby improving innovation outcomes.

Policy Implications

Policymakers play a pivotal role in nurturing innovation ecosystems. Beyond providing direct funding and infrastructure, governments can establish regulatory frameworks that facilitate collaboration, safeguard intellectual property, and promote open innovation (Chesbrough, 2003). Public-private partnerships, innovation hubs, and accelerators can further catalyze ecosystem development by bridging gaps between stakeholders.

Future Directions

Expanding the theoretical understanding of innovation ecosystems requires attention to their internal dynamics, contextual specificity, and inclusivity. Future research should adopt interdisciplinary perspectives, incorporating insights from sociology, environmental science, and behavioral economics. Addressing these areas will support the development of more resilient, equitable, and impactful ecosystems capable of responding to complex global

challenges, including climate change, public health crises, and digital transformation (Elzinga et al., 2023). Digital transformation, for instance, remains a multifaceted, multi-level phenomenon that continues to challenge both research and practice (Überlander et al., 2024).

METHODOLOGY

The study applied a longitudinal research design that utilized multi-source data across a long temporal span. The data included surveys conducted at different stages, thematic interviews with key stakeholders, and extensive project documentation. In the data analysis phase, AI-based analytical tools were used to support qualitative content analysis, particularly in identifying causal structures and recurring themes. This analytical framework deepened the understanding of the development of innovation management practices within the context of the Oulu Innovation Alliance (OIA) in Northern Ostrobothnia.

Document analysis was based on explicit selection criteria, classifying the data by document type (e.g., strategy documents, internal reports, evaluation reports, projects data) and temporal coverage. AI solutions were specifically applied to support qualitative content analysis, enabling the systematic structuring of complex data sets. The reliability and content validity of the study were strengthened through the integration of multiple data sources based on the principles of triangulation, as well as a repeated coding-based analysis process. This ensured the methodological accuracy and scientific credibility of the research.

RESULTS

The first strategic agreement period of the Oulu Innovation Alliance (OIA), spanning **2009–2014**, was structured around clearly delineated **thematic innovation centers**. The second strategic phase (**2015–2019**) signified a paradigmatic shift towards the adoption of **open innovation ecosystem** models. The ongoing third period (**2021–2027**) is organized around defined **strategic focus areas and programmatic priorities**. The subsequent section outlines key developments and selected outcomes from each of these strategic phases.

OIA Strategic Agreement Period I: 2009–2014

Oulu has a long-standing tradition of collaboration among educational and research institutions, industry, and the public sector. This foundation of cooperation contributed significantly to Oulu's emergence as a high-tech hub during the 1980s. As a continuation of this collaborative culture, the City of Oulu established a task force in 2007 to formulate recommendations for renewing the region's innovation environment. Following the publication of the Oulu Triple Helix report, a strategic innovation alliance agreement was signed in February 2009.

The Oulu Innovation Alliance (OIA) was founded through a partnership between the City of Oulu, the University of Oulu, Oulu University of Applied Sciences, VTT Technical Research Centre of Finland, and Technopolis. The overarching objective of the agreement was to maintain and enhance Oulu's position as an internationally recognized center of innovation. The founding partners committed to: Focusing their operations, education, research, and development activities on mutually agreed innovation areas; Investing in the development of shared infrastructures; Creating and advancing mechanisms for joint use. The initial focus areas were identified as Internet research, printed electronics, international business, environmental technologies, and the health sector. Innovation centres were established for each of these thematic areas.

A representative example of the results and operational model of this period is the Centre for Environment and Energy (CEE). The mission of CEE was to promote Oulu's identity as a hub for eco-innovation and the green economy. Its vision was to become the preferred partner in eco-innovation solutions. CEE projects transcended both geographical and disciplinary boundaries and concentrated on themes such as the bioeconomy, utilization of industrial by-products and waste, energy efficiency, and carbon neutrality.

During its three-year operational period, the value of research, development, and innovation (RDI) projects coordinated by CEE amounted to approximately EUR 8 million. These projects created local employment for over 150 individuals and generated more than EUR 1.6 million in regional tax revenue. In addition to coordinating RDI activities, CEE actively participated in direct business projects valued at over EUR 1 million. The center also contributed to the creation of spin-off companies; during this period, eight companies were established, with a combined turnover of approximately EUR 2 million and a collective workforce exceeding 20 employees.

OIA Strategic Agreement Period II: 2015-2019

During the second contractual period of the Oulu Innovation Alliance (OIA), spanning from 2015 to 2019, the previously established innovation centers were restructured and integrated into broader research communities. This strategic shift reflected a transformation in OIA's operational model, emphasizing the development of

innovation ecosystems. The principal change involved redefining innovation focus areas as ecosystems and committing to their long-term growth and maturation.

The ecosystem approach underscored the importance of collaboration, partnerships, and network-based operations. The ecosystems created during this period were structured around selected thematic areas and comprised diverse actors, including companies, academic and research professionals, students, public sector organizations, and end users. Within these ecosystems, services and products were co-developed, piloted, marketed, and commercialized through collaborative processes involving multiple stakeholders. A key feature of this interactive model was the use of testing and prototyping activities, accompanied by systematic feedback collection from customers. Programs and projects served as core instruments in the operationalization of ecosystem activities.

The primary objectives set for OIA during this period included: Ensuring that high-quality research outputs and innovative ideas, along with potential new products and services, are successfully commercialized i.e., marketed, sold, and made available to both Finnish and global markets; Promoting innovation that leads to the creation and growth of new businesses and services, including start-ups, new ventures of existing SMEs, and initiatives by large, leading enterprises; Enhancing the role of customers and residents as active contributors within the OIA network—as testers, co-developers, and creators of products and services. The operating model was built upon open innovation ecosystems, centered on five thematic focus areas: ICT & Digitalization, Oulu Health, Northern City with Attractive Opportunities, Industry 2026, and Agile Commercialization.

A representative example is the Industry 2026 ecosystem, which functioned as a collaborative network uniting businesses, researchers, public authorities, clients, and residents. Its focus was on reinforcing the regional value chain in the metal and machinery industries, generating high-value bioeconomy products, and enhancing environmental and energy resource efficiency. The Industry 2026 ecosystem also contributed to the formulation and implementation of the smart specialization strategy in Northern Ostrobothnia, which emphasizes identifying and leveraging regional strengths to foster innovation-led development. This approach aims to establish innovation ecosystems that support the renewal and competitiveness of regional industries and enterprises. A central principle of this strategy is the integration of academic, educational, and business actors in co-creating and applying new innovations. Additionally, regional expertise is augmented through partnerships with actors from both domestic and international networks.

In this context, clean technology emerged as a key area of specialization for the Oulu region. The cleantech sector in Oulu is characterized by cutting-edge research, a growing entrepreneurial base, and a robust innovation ecosystem. Major industrial players and five prominent research organizations act as enablers of innovation. The region also benefits from a number of emerging companies that contribute to business sector growth. Innovation efforts are manifested in ongoing RDI activities across several priority areas, including: New materials, products, and services derived from circular economy principles; Industrial resource efficiency and environmental responsibility; Decentralized and intelligent bio-based energy solutions.

OIA Strategic Period III: 2021–2027

The ecosystem agreement between the City of Oulu and the Finnish government for the period 2021–2027 is closely aligned with the strategy of the Oulu Innovation Alliance (OIA). Negotiated by the Ministry of Economic Affairs and Employment, similar ecosystem agreements were established with 16 city regions to strategically direct public and private research, development, and innovation (RDI) funding, while also strengthening Finland's international position as a pioneer in technological advancement, innovative procurement, and experimental culture.

Stakeholders involved in OIA during this third agreement period include the City of Oulu, University of Oulu, Oulu University of Applied Sciences, Educational Consortium OSAO, Natural Resources Institute Finland, VTT Technical Research Centre of Finland, the Wellbeing Services County of North Ostrobothnia, and Technopolis. OIA's vision for this period is to establish Oulu as the leading European innovation ecosystem that generates global added value through digitalization.

As a strategic consortium of key RDI actors in the Oulu region, OIA's mission is to enhance the innovation capacity of Northern Finland and improve its global competitiveness. Its commitment is to serve as the best partner for businesses and stakeholders in driving innovation. OIA offers companies access to a comprehensive innovation infrastructure, including research and development expertise, competence development, versatile testing environments, national and international networks, and potential funding opportunities.

The main goals of the collaboration within OIA are: Industry clusters and ecosystems generate new business and promote company growth; Spearhead programs unify, develop, and update regional expertise; Regional investment activity increases; RDI funding levels rise; Stakeholder commitment is strong, and the network is agile and attractive for new initiatives. Strategic priority areas include: Digitalization in the changing urban environment; Digital solutions for health and well-being; Sustainable cleantech economy and clean solutions.

These are complemented by cross-cutting themes such as start-up entrepreneurship, excellence and lifelong

learning, the creation and support of business ecosystems, and the city as an innovation platform framed under the Oulu Smart City concept. Practical implementation has been divided into 11 spearhead programs, with coordination responsibilities distributed among the alliance partners. One key focus area is the sustainable circular economy and cleantech solutions. The objective is to shift production and consumption towards responsible raw materials, renewable energy, durable products, shared resources, and recycled materials—reducing reliance on ownership-based models. A notable spearhead under this theme is the H₂ Research Hub and environmentally friendly steel.

An illustrative example is the emerging hydrogen economy project portfolio, with a total budget exceeding EUR 32 million. The spearhead themes include hydrogen use in the steel industry, materials research for hydrogen storage and transmission, and solar-driven electrolysis. Among these, the Hydrogen Business in the Future initiative and the development of a Hydrogen Vision for the Laanila Industrial Park stand out. These projects seek to provide a foundation for launching a hydrogen-based business ecosystem in Oulu and Northern Finland. The Laanila Industrial Park serves as a key platform for research-based development, demonstration, piloting, and learning activities. The overarching aim is to create a regionally significant and internationally recognized hydrogen economy ecosystem.

Oulu's achievement in the European Innovation Council's iCapital Awards exemplifies the city's sustained dedication to innovation and community-oriented development. The recognition demonstrates the city's ability to deploy innovation widely and effectively to improve residents' well-being. Oulu's holistic approach—blending nature and technology serves as a model for creating sustainable and inclusive urban environments that attract both talent and residents. The emphasis placed on all age groups in the award application highlights that innovation in Oulu is not limited to technological advancements but is aimed at enhancing quality of life across all life stages. This inclusive strategy strengthens community cohesion and ensures broader societal impact. Securing third place in the category for cities with fewer than 250,000 inhabitants reinforces Oulu's position as a trailblazer in future-oriented innovation. Oulu's longstanding role as a regional and international technology hub further underpins its success. The city's sustained investment in research, development, and innovation culture has established it as a model city in Europe.

Future Development of OIA

The successful development of an innovation ecosystem requires the systematic identification and mitigation of potential risks that may compromise the effectiveness and long-term sustainability of its operational models. A primary risk involves the adoption of an unsuitable operational model, which can lead to suboptimal decision-making and strategic misalignment. To address this challenge, a comprehensive analysis of the current state including existing practices and emerging opportunities is essential. The phased development of OIA's innovation framework since 2009 has provided valuable opportunities to test and refine strategic and operational structures in a dynamic environment prior to their broader implementation.

Another critical risk pertains to the inadequate implementation of the selected operational model. If the model is not fully adopted or fails to gain cultural acceptance within the organization, its sustainability is likely to be undermined. This may hinder the integration of innovation activities into the organization's core strategy and operational culture. Mitigating this risk requires sufficient resource allocation, structured training programs, effective communication strategies, and the proactive promotion of innovation initiatives. Moreover, maintaining transparency throughout the development process enhances stakeholder engagement and fosters trust.

Early and active stakeholder involvement across all phases planning, development, and implementation is vital. Inclusive participation reduces the likelihood of misunderstandings and strengthens collective commitment to shared objectives. Post-implementation support and continuous monitoring further ensure the smooth execution of the operational model and enable timely resolution of emerging issues. This holistic and participatory approach supports the institutionalization of innovation activities as a permanent element of the organization's culture and long-term operations.

Effective risk management, combined with strategic foresight, resource planning, and open communication, is fundamental to building a resilient and sustainable innovation ecosystem. These measures ensure that the operational model evolves beyond a conceptual framework to become an actionable and valuable element of everyday practice. In this context, the most effective innovation partnerships are those that foster future excellence and enable co-creation. Joint services and concrete mechanisms for participation serve as the foundation for such collaborations.

OIA stakeholders hold influential positions within national and international networks across various fields. Building on this foundation, OIA continues to expand its partnership networks and reinforce its strategic influence. Strategic foresight plays a pivotal role in identifying emerging needs. Effective utilization of business forecasting data equips stakeholders with a competitive edge and broadens their understanding of the operational environment and market dynamics. OIA is positioned at the forefront of identifying and capitalizing on new opportunities, particularly in areas such as digitalization and the data economy.

A key task of the alliance is the continuous assessment of short- and long-term talent needs among stakeholder companies, alongside the exploration of relevant educational opportunities. Tailored training programs aligned with specific business requirements represent a further strategic response. To facilitate dialogue and mutual understanding, OIA organizes joint forums involving employers and educational institutions. OIA's communication strategy operates bidirectionally: from external stakeholders into the alliance and outward from within the alliance to broader audiences. The communication channels of partner organizations are actively utilized to disseminate outcomes and foster visibility. Additionally, OIA organizes challenge-driven events and workshops designed to develop new solutions through open innovation methodologies.

CONCLUSION

The motto “Citius, Altius, Fortius”, faster, higher, stronger, perfectly encapsulates the lessons learned in Oulu's innovation journey. This spirit has been instrumental in driving the city's innovation ecosystem forward. By striving to improve processes, elevate ambitions, and strengthen collaboration, Oulu has established itself as a leader in innovation-driven development.

Key lessons include the importance of fostering an open and inclusive innovation ecosystem, where collaboration among diverse stakeholders accelerates progress. The commitment to continuous improvement, both in technology and in cultural maturity, underscores the need for adaptability and readiness to embrace change. OIA's focus on aligning high goals with measurable outcomes ensures that innovation efforts are purposeful and impactful. The city's success also highlights the value of integrating commercialization into research and development activities. This approach bridges the gap between ideas and real-world applications, creating tangible benefits for residents and businesses alike. Furthermore, clear roles, shared responsibilities, and strategic project portfolios ensure that resources are efficiently utilized and aligned with overarching goals.

In the dynamic landscape of innovation, collaboration and cooperation are pivotal for sustainable development. The concept of working together emphasizes the importance of co-development and the ability to collaborate across diverse sectors. This approach is complemented by the establishment of an open innovation ecosystem, which serves as a platform for diverse stakeholders to contribute their expertise and resources. The success of such initiatives relies heavily on the will and commitment of all involved parties, ensuring a unified vision and steadfast progress. Innovation today requires a revolutionary mindset. Cultivating an innovation culture that matures over time is essential for addressing evolving challenges. This journey involves the effective management of resources to optimize their impact while fostering an environment where creativity can thrive. Setting high goals, such as achieving world-class standards, ensures that innovation efforts remain ambitious and aligned with global trends. Additionally, fostering ecosystem cohesion, supported by both internal and external metrics, strengthens the collaborative framework that underpins innovation success.

A clear strategy and structured implementation are vital for turning innovation into actionable results. Defining roles and responsibilities ensures that efforts are well-coordinated, while efficient practices and policies provide a solid operational foundation. A shared strategic Research, Development, and Innovation (RDI) project portfolio further aligns efforts across stakeholders, maximizing synergies. Importantly, taking commercialization into account as a key component of RDI activities bridges the gap between ideation and practical application, driving real-world impact and economic value.

Future-focused innovation demands agility and adaptability. The emphasis on focusing on today and tomorrow reflects the necessity of forward-thinking strategies while acknowledging the lessons of the past. Building a strong foundation based on shared commitment and a unified goal ensures stability amidst change. However, success also depends on the readiness to embrace new approaches and do things differently. This flexibility empowers stakeholders to navigate uncertainties and seize emerging opportunities, creating a sustainable and resilient ecosystem for innovation.

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EURO ADOPTION AND ITS INFLUENCE ON DIFFERENT SOCIAL GROUPS: THE CASE OF THE BALTIC COUNTRIES

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Abstract:

The paper examines the effects of the adoption of the euro in Lithuania, Latvia and Estonia. We estimate the impact of currency changeover and examine which specific demographic groups of consumers (by their age, education, and income levels) were the most sensitive to the currency changeover. Results suggest that in Estonia and Lithuania better educated, higher income consumers between 30 and 49 years of age were the most sensitive for the adoption of the euro. In Latvia the effect of the adoption of the euro was the highest for better educated consumers of more than 65 years of age and those, who get the lowest levels of income. The main reason for country differences lies in the differences of product groups, which were affected by the currency changeover.

Keywords: euro, euro adoption, currency changeover, inflation, prices.

JEL Classification: D84, E31, I31

INTRODUCTION

Joining the Eurozone provides a number of benefits: price transparency, easier travelling, no currency exchange costs and greater economic stability. However, citizens of a candidate country usually tend to expect improbity of the firms and therefore higher inflation and reduced living-standards. Current research finds that the change of utility and inflation perceptions were the worst for the older, unemployed, poorly educated, lower earning and children raising consumers (Dziuda & Mastrobuoni, 2009; Otrachshenko et al, 2016; Anttila, 2004).

Based on these findings, the paper aims to investigate which social groups were the most affected by the adoption of the euro in the three Baltic States: Estonia, Latvia and Lithuania.

The three Baltic countries were chosen due to a couple of reasons. First, although there is extensive research covering the countries that were the first to adopt the euro in 2002, the literature examining the later expansion of the Eurozone is still rather sparse. Introduction of the euro in the countries of Eastern Europe may have had different impact for the prices and the well-being of these countries, as their economic standing, prices and wages were significantly lower than in the old Eurozone members. Second, while all three Baltic States are similar in their economic standing and have close economic relations with each other, they adopted the euro in different years (Estonia in 2011, Latvia in 2014 and Lithuania in 2015). Hence, analyzing all three of them could minimize the influence of any global shocks on the perceived inflation and reveal if the effects of the currency changeover were the same for all countries or rather country and time specific.

In the paper we seek to investigate the impact of the adoption of the euro on different social groups in the Baltic countries by their age, education and income. Following Anttila (2004) and Otrachshenko (2016) and Dziuda & Mastrobuoni (2009), we hypothesize that the currency changeover had worse consequences for the older, less educated and low-income consumers.

Our analysis provides no evidence that the greatest negative impact of the currency changeover was for the oldest, less educated and low-income consumers. Therefore, we argue that the impact of the adoption of the euro is country-specific and depends on the products the prices of which are affected by the currency changeover. Hence, the effects of the currency changeover may be related to the timing, economic standing of the country and global financial situation.

The paper contributes to the literature on the impact of the adoption of the euro on the consumers. The research gives insight into the possible consequences of the currency changeover and could be useful for the countries still preparing to adopt the euro.

The setup of the paper is as follows: in Section 1 we review the literature, Section 2 analyzes the market situation in the Baltic countries, in Section 3 we describe data and methodology, and Section 4 provides the main results. Finally, we conclude.

LITERATURE REVIEW

The paper relates to the literature on inflation perceptions and the consequences of the currency changeover for the consumers. Many researchers claim that the change of currency is not important for the change of prices.

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Moessner (2022) argues that inflation expectations in the euro area mostly depend on the currency exchange rate. Maurer (2023) claims that the inflation rate is positively correlated with the GDP growth, while Heller et al. (2019) finds that the increase of prices in the CEE countries could be explained by the convergence of business cycles. Degler & Staehr (2019), Nguyen & Rondeau (2019) and Halka & Leszczynska-Paczesna (2019) argues that the prices in CEE countries converge to the ones in Western Europe. Golob et al (2009) and other authors claimed that after the currency changeover the firms were socially responsible, hence, the majority of prices did not change (Kotlinski, 2020; Hegerty, 2020) or even decreased (Schulze (2016). Kornher et al (2024) argues, that food price inflation is mostly driven by the agricultural production costs and global food price trends.

However, other researchers find that the adoption of the euro results in an increase of the prices of more frequently bought goods (Pufnik, 2017; Del Giovane & Sabbatini, 2005). Hobijn et al (2004) claims that it results in the increase of the restaurant prices because of the menu costs, while Aalto-Setälä (2005) notes that currency changeover affects the endings of the prices. Dziuda & Mastrobuoni (2009) argue that although the average inflation rates in the first 12 Eurozone countries in 2002 remained low, the currency changeover resulted in an increase in prices of cheaper goods. They argue that given that consumers base their understanding of the inflation rate on the prices of the cheaper, most frequently bought goods, perceived inflation was higher than the actual inflation after the introduction of the euro in almost all these countries. Lamla et al (2015) claimed that this effect was amplified by the media.

Dziuda & Mastrobuoni (2009) also found that the rise of prices of cheaper goods was positively related to the average age and negatively related to the price transparency and the average education of the population. These results are in line with the findings of Otrachshenko et al (2016) and Anttila (2004) who claim that the change of utility and inflation perceptions were the worst for the older, unemployed, poorly educated, lower earning and children raising consumers. Petrylė (2023) argues that the currency changeover results in the increase of prices of services and durable goods, however, may even lead to the decrease of prices of some other goods.

Based on the above literature, this research aims to investigate which social groups were the most affected by the introduction of the euro in the three Baltic States: Estonia, Latvia and Lithuania.

The effects of the currency changeover for the Baltic countries

The European Commission (2011, 2014, 2015) assessed the short-term (1 month before and 3 months after the currency changeover) impact of the adoption of the euro on the inflation in the Baltic States. The studies show that the adoption of the new currency in Estonia, which happened on 1 January 2011, increased inflation during the period from December 2010 to March 2011 by 0,2-0,3 percentage points. Latvia adopted the euro on 1 January 2014 and it increased the inflation of January 2014 by 0,12-0,21 percentage points. In Lithuania, where currency changeover happened on 1 January 2015, inflation of January 2015 increased by 0.04-0.11 percentage points (the other 2 months were found to be insignificant). Hence, the impact of the currency changeover in all three Baltic countries was noticeable, however, not large.

Still, consumers in the Baltic countries had different inflationary perceptions. Comparison of the data for the actual and the perceived inflation in the three Baltic countries is given in Figure 1. Perceived inflation is based on survey data calculated by the European Commission and represents consumers' qualitative opinions on inflation developments in the EU countries. This statistic fluctuates in a range of [-100, +100], and *“only provide information on the directional change in prices over the past (...) 12 months, but with no explicit indication of the magnitude of the perceived (...) rate of inflation”* (Arioli et al, 2016).

Figure 1 shows that Latvian consumers were the most accurate in perceiving the change of prices. In Latvia the difference between actual and perceived inflation remained stable in the period around the currency changeover. However, for Estonia and Lithuania the difference between the perceived and the actual inflation decreased sharply for the first 1-2 months after adoption of the euro and then increased and remained higher than usual for the next 3-4 years.



Figure 1. Perceived minus actual inflation in the Baltic States (normalized)

Table 1 summarizes the effects of the euro adoption on different goods and services in Lithuania, Latvia and Estonia, based on the recent findings (European Commission, 2011, 2014 & 2015; Petrylė, 2023). Table 1 shows that for all three countries the largest price increase after the currency changeover was seen for the services and household sectors. In Latvia several food items were also affected and in Estonia and Lithuania prices of beer or spirits also increased. In Estonia only the increase of prices was noticed, while in Latvia and Lithuania the prices of garments, shoes and some food items even decreased.

Table 1. Sectors that experienced the increase and decrease of prices after the adoption of the euro in Lithuania, Latvia and Estonia

	Estonia	Latvia	Lithuania
Prices increased	Services	Cultural, hairdressing, grooming, medical, catering	Cultural, hairdressing, grooming, medical, cleaning, repair and hire of clothing, catering
	Household	Maintenance and repair of dwelling	Maintenance and repair of dwelling
		Non-durable household goods	Household appliances
			Housing rentals Newspapers & periodicals Recoding media
	Food & beverages	Meat, bread, cereals, sugar, jam, honey, chocolate, confectionary, mineral waters, soft drinks	Spirits
Prices decreased			
	Clothes & shoes	Garments	Shoes & other wear
	Food & beverages	Coffee, tea & cacao	Meat, fish, bread, cereals, sugar, jam, honey, chocolate,

	confectionary, coffee, tea & cacao
	Beer
Pharmaceuticals	Pharmaceutical products

(Source: European Commission, 2011, 2014 & 2015; Petrylė, 2023)

The studies show that in the short-term actual inflation in the Baltic countries remained stable and currency changeovers had no large negative effects. In all three countries perceived inflation fluctuated together with the actual inflation, however, on a different scale.

Data and methodology

Following Anttila (2004) and Otrachshenko et al. (2016), we hypothesize that currency changeover had more negative impact for the older, less educated and lower income consumers. We check the hypothesis by examining the relationship between the perceived and actual inflation for each demographic group (by age, income and education levels) of consumers in each of the Baltic States.

The research takes the scope of 6 years: 5 years before the currency changeover and 1 year after it for each Baltic country. As the adoption of the euro happened in different years in Lithuania, Latvia and Estonia, we have different analysis periods for each Baltic country: 2011-2016 for Lithuania, 2010-2015 for Latvia and 2006-2012 for Estonia.

For each Baltic country and each demographic group (j) we estimate the following regression:

$$\pi_{j,t}^P = a_j + b_j \pi_t^T + c_j d_t + \varepsilon_{j,t}, \quad (1)$$

Here, $\pi_{j,t}^P$ stands for perceived inflation by the demographic group j in period t in one of the Baltic countries, π_t^T shows actual inflation at time t , and d_t is a dummy variable (equal to 1 if euro was used at time t in the analyzed country and 0 if not). The estimate of coefficient c_j shows the average increase of the perceived inflation after the currency changeover as perceived by the demographic group j . The model is specified under the OLS specification.

The following monthly data was used for the research:

The data on actual inflation. For the actual inflation we used monthly deseasonalized Harmonised Consumer Price Index (HCPI) of different product groups, which was retrieved from Eurostat database. Newey-West procedure is applied to avoid annual correlation of the residuals (Newey & West, 1987).

The data on perceived inflation (qualitative indicator). The data was retrieved from the Business and Consumer Surveys of European Commission (2018). Consumers' answers on their perceived inflation in each of the Baltic countries are classified to demographic groups according to the age, education and income of the respondents.

THE RESULTS

Relationship between the perceived inflation and age

Based on the common belief that older residents experience more difficulties in understanding new prices after the currency changeover, we hypothesize that the gap between their perceived and actual inflation rates should be wider. In order to examine this relationship, we estimate the model for each age group (16-29 years, 30-49 years, 50-64 years and at least 65 years of age) and country, using 6 years of monthly data.

Table 2 gives the estimates of coefficient c_i , which shows the average increase of the perceived inflation (in qualitative indicator units) after the currency changeover as perceived by the given age group.

Table 2. Estimates of euro-related perceived inflation by age groups

	Age group	c_i	s. e.*	t-value
ESTONIA	16-29 years	28.90***	3.13	9.25
	30-49 years	36.51***	4.00	9.12
	50-64 years	32.34***	3.53	9.15
	≥ 65 years	24.17***	3.02	8.00
	Age group	c_i	s. e.*	t-value
LATVIA	16-29 years	10.96***	4.28	2.56
	30-49 years	13.82**	6.29	2.20
	50-64 years	13.32**	6.37	2.09
	≥ 65 years	15.59***	5.51	2.83
	Age group	c_i	s. e.*	t-value
LITHUANIA	16-29 years	7.23***	2.85	2.53
	30-49 years	10.05***	2.88	3.49
	50-64 years	6.33**	2.87	2.21
	≥ 65 years	8.54***	2.84	3.00

Robust standard errors, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 2 shows that Latvian results are in line with the hypothesis. In Latvia after the currency changeover perceived inflation increased the most among the oldest consumers. The second most affected age group were people between 30 and 49 years of age. However, the difference between the results of this age group and the people having 50-64 years of age is negligible. The least affected respondents belong to the age group of 16-29 years. This group could be affected the least because it mostly consists of pupils and students. Usually, they are still supported by their parents and have a limited expenditure structure (mostly related to their own needs and leisure).

The results for Estonia and Lithuania are different. In these countries the average increase of the perceived inflation was the highest among the people of 30-49 years. Most probably it is because this age group is the most economically active and has the largest and the most diverse expenditure structure: food, dwelling, transport, childcare, etc. On the other hand, the oldest age group (≥65 years) are mostly pensionaries, having grown-up children, already paid-out loans, and a more basic expenditure structure. Therefore, as euro-related inflation in the Baltic countries was not related to the increase in the prices of the basic products (European Commission, 2011, 2014 & 2015; Petrylė, 2023), the group above 65 years could be less sensitive to the currency changeover.

Relationship between the perceived inflation and education level

The more people are educated, the higher their openness and their abilities to calculate and to adjust to changes should be. Therefore, we hypothesize that more educated consumers adopt to a new currency easier, hence, their perceived inflation should be lower.

We group the Baltic States data on the perceived inflation to three education groups: basic education (people who finished schooling having not more than 15 years of age), high-school (the ones who completed high-school) and higher education (college or university) and estimate equation (1). Having three Baltic countries and three demographic groups gives us nine regressions to estimate, taking 6 years of monthly data.

The estimate of the coefficient c_i from equation (1) shows the average increase of the perceived inflation (in qualitative indicator units) after the currency changeover as perceived by the consumers of a given level of education. The results are presented in Table 3.

Table 3. Estimates of euro-related perceived inflation by education level in the Baltic countries

	Education group	c_i	s. e.*	t-value
ESTONIA	Basic	21.84***	2.96	7.38
	High-school	32.06***	3.24	9.88
	Higher	34.78***	3.81	9.13
	Education group	c_i	s. e.*	t-value
LATVIA	Basic	14.67***	4.28	3.42
	High-school	5.96**	2.46	2.42
	Higher	15.50**	6.85	2.26
	Education group	c_i	s. e.*	t-value
LITHUANIA	Basic	5.78**	2.77	2.09
	High-school	9.65***	2.94	3.28
	Higher	6.61**	2.86	2.31

Robust standard errors, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3 shows contradictory results for all three countries. In Estonia and in Latvia people having the highest level of education also had the highest increase of the perceived inflation. The rise of perceived inflation was the lowest for the people having the lowest education levels in Estonia and the high-school graduates in Latvia. In Lithuania the highest increase of the perceived inflation was among the high-school graduates, and the lowest was among the ones having only the basic education.

Therefore, we cannot confirm the hypothesis that the increase of perceived inflation is lower for better educated consumers. On the contrary, it seems that in general for the Baltic countries higher education means a higher jump of the perceived inflation.

Relationship between the perceived inflation and income

Usually, lower income results in higher sensitivity towards price changes. Therefore, we hypothesize that perceived inflation is higher for lower-income consumers.

The data on the perceived inflation is classified to quartiles according to the income levels: the 1st quartile shows the lowest income, and the 4th quartile stands for the largest income. Having three Baltic countries and four income groups gives us 12 regressions to estimate, taking 6 years of monthly data.

We estimate equation (1), where coefficient c_i shows the average increase of the perceived inflation (in qualitative indicator units) after the currency changeover as perceived by the given income group.

Table 4 shows that in Latvia perceived inflation increased the most for the 1st (as anticipated) and the 4th income quartile. Still, in Latvia the differences between the growth of the perceived inflation between income quartiles is negligible. In Estonia and in Lithuania the highest average growth of the perceived inflation was noticed for the 3rd and the 4th income quartiles respectively. This result could be explained by the fact that people having higher incomes usually buy more products and they are more expensive. Consumers having higher income could have faced greater price increases and, therefore, perceive higher average inflation than the other ones, because of the greater increase in prices of more expensive product, e.g. services (European Commission, 2011, 2014 & 2015; Petrylė, 2023).

The lowest average growth of the perceived inflation was noticed for the 1st income quartile in Estonia and for the 3rd income quartile in Lithuania. Estonia's results could be explained by the fact that in Estonia euro-related inflation was not seen for the basic products, which are mostly used by the low-income holders. Second, since 2008 Estonian minimal wage was the highest among the Baltic countries, hence, consumers belonging to the 1st quartile, among which minimal wage possibly dominates, could have felt comparatively "safe" during the currency changeover

Table 4. Estimates of euro-related perceived inflation by income level in the Baltic countries

	Income level	c_i	s. e.*	t-value
ESTONIA	1st quartile	27.12***	2.98	9.10
	2nd quartile	30.98***	4.03	7.69
	3rd quartile	38.73***	4.76	8.14

	4th quartile	31.32***	2.89	10.84
	Income level	c_i	s. e.*	t-value
LATVIA	1st quartile	14.10***	5.61	2.51
	2nd quartile	10.05*	5.65	1.78
	3rd quartile	10.18*	5.72	1.78
	4th quartile	11.62*	7.17	1.62
	Income level	c_i	s. e.*	t-value
LITHUANIA	1st quartile	8.56***	2.86	2.99
	2nd quartile	7.57***	2.93	2.58
	3rd quartile	6.79**	2.96	2.29
	4th quartile	9.12***	2.89	3.16

Robust standard errors, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.11$.

Overall, in Estonia and in Lithuania the increase of the perceived inflation after the adoption of the euro was the highest among the high-income consumers. In Latvia it was among the low-income holders. The lowest euro-sensitivity was noticed for the 1st income quartile in Estonia and in the middle quartiles in Latvia and in Lithuania. Therefore, the hypothesis that perceived inflation is higher for consumers having lower income in the Baltic States was not confirmed.

CONCLUSIONS

We find contradictory results about the relationship between the perceived inflation and specific demographic variables in the Baltic States. We conclude that the group of consumers which were the most sensitive to the adoption of the euro were better educated people between 30 and 49 years. This could happen mainly because of differentiated effects on product prices in different countries. In all three countries the adoption of the euro caused the greatest increase in prices of different kinds of services and household related products. As household related products are mainly consumed by people between 30 and 49 years of age and families, this group was the one to experience an increase in prices and, hence, to perceive the highest inflation.

The youngest consumers (16-29 years age group) felt just a small impact of the currency changeover in all three countries, most probably because they were mainly supported by their parents and had only a limited expenditure structure. The relationship between euro-related perceived inflation and income level was the most diverse. In Latvia it was the largest for the 1st income quartile, because the prices of basic food items increased after the currency changeover. While in Estonia and in Lithuania and higher-income groups were the most affected. Most probably because of the increase in prices of services (cultural, catering, hairdressers and the like), which are mostly consumed by better educated people with higher income.

Overall, the analysis of the Baltic countries provides no evidence that the greatest negative impact of the currency changeover is for the oldest, less educated and low-income holders. The findings suggest that the impact of currency changeover could be related to different periods of the adoption of the euro in the three Baltic countries and is reflected in different economic situation in the years of the currency changeover.

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DROPSHIPPING IN B2C MODEL OF BUSINESS

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Abstract:

The paper explores the question of the ease of starting a dropshipping business and the sustainability of such a web store model. It is focused on the real-life case study of launching the LittleCharm webshop. The purpose of the paper is to determine the simplicity of starting and managing a dropshipping business. The webshop has undergone all the necessary steps and processes to assess whether the perception of the ease of opening and maintaining such a business is valid. The paper serves as a guide for anyone interested in starting their own dropshipping business. The research methodology is based on a personal study of the application of the dropshipping model in marketing. The most important aspects include theoretical analysis and practical implementation of the model. Defining the dropshipping model, identifying key components such as supplier selection, niche determination, marketing strategy, and branding are all included. By using Shopify and AutoDS platforms, the paper demonstrates the practical application of setting up a dropshipping store. The selected niche for LittleCharm focuses on baby and children's products, as this topic aligns with the personal interests and experiences of the entrepreneur. Branding efforts included creating a recognizable name, logo, and domain to ensure visibility and credibility in the target market. An organic marketing strategy was developed, using social media platforms such as Instagram and TikTok to promote products without paid advertisements.

The result of the research is the creation of a dropshipping model. Key findings indicate that starting a dropshipping business is achievable with minimal initial investment and no need for a fulfillment center. Success depends on several factors, including selecting reliable suppliers, implementing effective marketing strategies, and providing excellent customer service. The study highlights the importance of maintaining focused branding and product differentiation to gain a competitive advantage in the market. An additional benefit for the business is the automation of processes such as order management and customer communication, as this frees up time for strategic long-term business growth.

The LittleCharm case study revealed that, although establishing a dropshipping business is relatively straightforward and easy, maintaining it requires continuous product research, constant learning, and adaptability to market changes. Marketing strategies need to be innovative and focused on building a strong customer base. Organic marketing, combined with good customer engagement, provides a cost-effective and efficient approach. In conclusion, the paper demonstrates that dropshipping is a sustainable business model for entrepreneurs willing to invest time and effort in learning and improvement. The survival of a dropshipping business depends on persistence, frequent product searches, effective marketing strategies, and continuous knowledge expansion. Like any business, progress requires time and effort. With proper planning, branding, and strategic execution, a dropshipping business can achieve long-term profitability and sustainability.

Keywords: Dropshipping, webshop, marketing, Shopify, LittleCharm

DROPSHIPPING

Dropshipping is a business model in which products can be sold without manufacturing them or having a warehouse. All incoming orders can be made on one computer and the dropshipper doesn't even see or manipulate the product in any way. Processing orders and forwarding them to the manufacturer while handling customer care allows the dropshipper to make their share of the profit. It benefits the manufacturer because the dropshipper sells and promotes their product even more. The dropshipper and the manufacturer (fulfillment warehouse) make a contract in which the dropshipper is obligated to forward and process all incoming orders to the manufacturer.¹

One of the biggest advantages of dropshipping is the ease of hopping on trendy products like, for example fidget spinners or hoverboards that made a huge profit for dropshipping businesses. With a small initial stake, no packaging, no warehouse and selling more different products at once the greatest factors are finding good suppliers and products, great marketing ideas and of course persistence. The sale is possible from wherever and whenever, and the possibility of lost orders are very low since the product is shipped directly from the supplier to the customer. Product list can easily be changed or added, especially if a new interesting product pops on the market. This is the most important advantage because it creates the possibility for long term profit.

The biggest shortcoming of dropshipping is the profit is seen on average after 5-6 months but sometimes dropshippers hit a jackpot with a product that goes viral and they make a big profit. The solution is to be persistent, improve knowledge and constantly search for good products and marketing ideas. Other faults include no control over product quality, shipping rates or shipping time and selecting bad suppliers. These faults highlight the

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importance of finding good, trustworthy and loyal manufacturers/suppliers. It's not pleasant to deal with unhappy customers and product returns considering that it can also lead to a profit loss. The customer doesn't know the manufacturing chain so they will contact the dropshipper from whose website they bought the product from. That communication will be prolonged because there is no direct customer contact with the supplier. All the negative sides of dropshipping can be overcome in time by learning on past mistakes and drastically reducing them as much as possible.²

Dropshipping process

Opening an LLC (Limited Liability Company), a C corporation or as an independent entrepreneur are the main business structures for a dropshipping model. The best recommended structure is an LLC because it offers protection over private property and autonomy of private finances and expenditure.³

Starting a dropshipping business demands that a person has to have a certain skill set which includes management, marketing on social media, customer service, bookkeeping etc. When a person is investing their own time and effort, they will gain knowledge about the entire business process and their focus market. That will help them gain the necessary experience to notice profitable investments in the future.

The most important components are product identification, choosing the right supplier and establishing your own brand. The selected product has to be trendy, have the potential to be trendy or it must be selected according to the interests of the entrepreneur so they can better promote the product. Having a good and loyal supplier means better and faster ordering process and customer support especially when the online store offers more products at once. It is crucial for an entrepreneur to establishing their own brand so it could serve as a guide for their business. Brand name and logo have to be short, memorable and all the product in the online store have to be associated with the brand.

The dropshipper is responsible for all communication with the customer. Generating a tracking number, dealing with problems and similar issues are all obligations of the dropshipper although from the customer point of view the dropshipper doesn't even exist.⁴

WEBSHOP LITTLECHARM ON SHOPIFY

One of the biggest platform for creating and maintaining an online store is Shopify. It is simple and there is no need to do anything in code because the platform offers many tools and templates which can be changed however it is necessary. For opening a dropshipping store include making a webshop (on Shopify), choosing a winning product or niche, webshop branding, marketing and automatization.

Opening the webshop littlecharm on shopify

The process of opening the LittleCharm webshop on the Shopify platform is a real-life representation of market selection, product or niche selection, marketing and other elements. Steps for opening a webshop on Shopify involve registration on Shopify, registration on AutoDS platform, choosing a niche, making a website on Shopify, defining payment and shipping, choosing products on AutoDS and marketing. On the Shopify platform, after registration and giving personal information, a dropshipper can start to make and mold their webshop as they please and it is possible to make changes whenever it is needed. Shopify is linked to other supplier searching platforms and one of them is AutoDS. Registration on AutoDS allows the dropshipper to link their webshop to suppliers and find many various products. All product is sorted in categories, suppliers, price, shipping time, currency etc. If there are interesting products on another platform then they can be manually linked as well. Products have to be connected in some way and therefore a niche has to be selected. For LittleCharm the niche is baby and kid's products like gadgets or toys and products that help parents with their kids. This means that the target market are parents with babies and kids up to 12 years and. This niche was selected because the entrepreneur or LittleCharm has kids and is always in search for amazing gadgets or toys for them. When opening LittleCharm the name was checked so that there would not be similar online stores, the logo was created with a free tool Canva and the whole webshop was created on Shopify platform. It is very important to also add a terms and conditions page, search page, home page, product page and a cart page. The tool Chat GPT can be used for all the text on these pages. Shopify automatically gives you a store domain but is better to have a domain which contains the store name in it because it increases searchability when a customer is looking for the online store. The store domain for LittleCharm is littlecharm.store and it was under 2 dollars for a year fee. When all is set up the next step is defining payment which typically involves Paypal or bank transactions. Paypal can be linked to the Shopify account and all e-mails can be forwarded to one mail address. The shipping time and rate depends on the supplier chosen on the AutoDS platform. On the platform every product has product details, price, shipping rates, shipping time, supplier details, competition, sales statistic etc. The information on the competition can be valuable for exploring product, marketing strategies or product prices. The first product LittleCharm selected was a small nose

aspirator for babies. It is promoted on social media in short videos which show how to use the product with cheerful background music. Putting them on different social media like Instagram, TikTok, Facebook or Pinterest increases the possibility for the video to go viral. That will gradually increase the development of organic marketing which is the best type of marketing for this business model. The promotion has to differentiate the product from others so that they can stand out. All elements that include branding have to be synchronized so that the webshop would look more professional and legitimate. Investing time, energy, always expanding knowledge, differentiating the products, investing in long-term business is the recipe for success.

Winning product or niche

Two platforms, AutoDS and AliExpress, are the best for finding and sourcing great products. AutoDS has a huge product and supplier capacity. Its search engine enables automatic search based on keywords and shipment speed. Necessary components of a winning product are basic knowledge of the product or niche, wow effect, problem solving or life improving product. Popular product with a wow effect right now are the double glassed mugs with small flowers in them. Another popular product is the rotating brush which has the wow effect and it makes the customers life easier. Kids toys are always more expensive even though they can be bought by a much smaller price directly from the manufacturer. This means that the profit margin will be much higher.

The first product LittleCharm selected is a small aspirator for a baby's nose. When a parent sucks in air through one tube, he extracts secretions from the child's nose through the other. The product solves two problems. In addition to making it easier for the child to expel secretions from the nose, parents can also do this while the baby is sleeping because the product is small, silent and practical. It has all the necessary elements by which the product for sale has to be selected. The LittleCharm's owner has basic knowledge and experience with children's products because she has her own children, and the wow effect is the practicality and small size of the product. Unlike electric aspirators that are noisy and weak or impractical and expensive aspirators which are connected to the vacuum cleaner, this product works by drawing in the air while all the snot is sucked in. It solves a problem and improves someone's life.

The market must first be segmented into parts. Segmentation can be based on age, gender, interests, business, income, geographic location or a combination of several variables. When the criteria of the segment is determined the niche marketing is obtained. A niche comprises a subgroup within a segment and offers the possibility of a special combination of advantages. Choosing a niche gives smaller businesses a competitive advantage by concentrating their limited resources in a part of the market that is unimportant or unnoticeable to large companies.

After analyzing and defining various business segments, the dropshipper makes a decision which segment or segments to choose. A target market is a group of customers who share common needs or characteristics. The dropshipper can apply strategies like unidentified marketing, differentiated marketing and concentrated marketing. With undifferentiated marketing, the entire market is flooded with one market offer, and with differentiated marketing, multiple market offers are made for several segments. Concentrated marketing is the best strategy for a dropshipping or a businesses with limited resources because all marketing effort is invested in a larger part of the market within the segment. The choice of strategy usually depends on the means of business, the degree of variability of the product and the variability of the market. The basic strategy is central in marketing. First, it is necessary to identify consumers for whom the business has a differentiating advantage, and second is the positioning of one's own offers in the minds of consumers.⁶ For the LittleCharm webshop, the target market are parents of babies and younger children (up to 12 years old) who are looking for various gadgets, educational and fun toys, etc.

Preference in the selection is given to products that provide consumers with greater value. This is why it is important to understand their needs and buying processes. Competitive advantage arises when a business is positioned as if it is a provider of superior value compared to its competition. If the consumer is offered the best quality and service, then the business must be consistent with that and must meet those expectations. The success of differentiation depends on differentiating the way consumers want it. Differentiation is possible by product, service, brand and value. Differentiation for LittleCharm is the offer of interesting products that help parents and children or provide them with additional entertainment. Since children's clothing, food and large products such as furniture are not offered, a specialized store is created. Selling unusual gadgets creates a special niche.

Marketing

When making advertising decisions, it is necessary to set advertising goals determined by the advertising budget, develop an advertising strategy and evaluate advertising campaigns. Advertising can be informative, persuasive and advertising by a reminder. Informative advertising provides information to the market about a new product. Persuasive advertising changes the customer's perception and induces him to buy and advertising by reminding

maintains top product awareness by reminding the customer. The most important thing is that the advertising message attracts attention and clearly conveys the message.⁷

Due to the strong preference for specific niches in the market, one of the main techniques used is direct marketing. The message about the product is communicated directly to carefully selected clients. Direct marketing is easy for customers because they search for specific websites with the products, they need from the comfort of their own homes. This technique is simple for the customer because it gives him the possibility of a quick and broad overview of the product. According to these features, dropshipping is classified as one of the forms of direct marketing.⁸ Organic marketing is the most widely used and is an umbrella term for all non-paid marketing activities aimed at an online audience. There is no need to pay third party platforms like Facebook or Google for clicks or ads. Through free marketing tactics increased traffic is achieved if the product is well promoted and if the keywords for the algorithm on the platforms are well chosen. Every comment, like and video viewed entirely increases the popularity in the algorithm and thus the video is shown to a larger audience. The number of customers increases gradually over time and not through paid promotion. Organic marketing allows the dropshipper to use his own marketing skills and creativity to get new customers. Similar to it is content marketing because most organic marketing methods depend on good content or content to increase audience and sales. The difference is that content marketing mostly uses paid advertisements, while organic does not. Through constant investment and work, it is possible to achieve long-term sources of traffic. This approach greatly increases brand loyalty, its credibility and positive experience.

Some methods of organic marketing include search engine optimization (SEO), social media, lead magnets, e-mail campaigns, live events, webinars, podcasts, digital PR, partnerships, affiliate marketing and customer testimonials. Search engine optimization (SEO) is a very important long-term strategy which enables targeted and stable traffic through keywords on Google or other search engines. The best tools to specify best keywords are Ahrefs and StoryChief's AI Keyword Generator. A large number of businesses use social media as a means of advertising, given that the majority of the world's population uses them. Methods such as creating followers (subscribe), hashtags and audience engagement are used to invite the audience to participate and thus increase the space for that advertising content within the algorithm. On the other hand, lead magnets are closed information resources such as guides or webinars that customers receive in exchange for their data (name and email). They include eBooks, templates, video courses, checklists, lists, etc. Creating a customer database allows businesses to send e-mail campaigns where marketers offer lead magnets in exchange for email addresses, newsletter with discounts, vouchers, webinar invitations etc. Live events and webinars can be virtual, hybrid and face-to-face. They are more extensive in terms of content, but they also offer customers a deeper insight into the brand and the product itself. The most important thing is that the content is in the center of attention and that it solves some problem of the audience. Digital PR includes promotion related to the owner of the company through various podcasts, events, posts on social networks, etc. Now very popular are podcasts for generating content that can be placed on multiple platforms. They are video or audio series in which various topics and opinions are discussed. It's a great way to connect more with customers through various stories and examples and they open up a possibility of an interview. When a third party advertises the product and receives a commission from its sale it means affiliate marketing is used. Even though organic marketing is a non-paid advertising tool, here affiliate marketing is used only on specific products or videos. Partnerships are a great way for businesses to connect or to make a unique product together. The content is qualitative, not quantitative and the created content is intended for the audience of both companies which also share lead magnets. When the product is good the word-of-mouth advertising will also be a big advantage. Customers mostly believe other customer testimonials which are the most reliable method for increasing brand credibility and acquiring new customers.

Developing an organic marketing strategy is possible through researching customer needs and competitor content, selecting channels and platforms for advertising, planning content topics, and creating a promotional plan and content execution. Interviews and research surveys will help to know about the customer's needs because it is necessary to have extensive knowledge about the target market. All collected data needs to be analyzed and sorted for future use. Even with the competition their best-selling product and advertising methods and platforms are checked. To start advertising, search engine optimization (SEO), TikTok and Instagram are chosen to increase traffic, and then lead magnets and email campaigns are used. To plan the topic content, it is necessary to find a popular topic that is very important to the target audience so that the content can be mapped to these topics. Then a promotional plan is created and the platforms where it will be placed, the content it will include, etc.

There are various tools for improving sales within organic marketing. Finding experts who are in the same business, use the same niche or sell the same product is a great tool to gain information from the experience of others. The data source can be from interviews, professional literature, articles, webinars, etc. Testing various promotional methods and platforms will show how which groups of customers react to the product and this enables better adaptation to the market. All created marketing content can be used to the maximum. It means it will be placed on several platforms like blogs, social networks, podcast, etc. It is possible to include influencers, colleagues and partners to increase the reach of the brand. This also opens up the possibility of brand ambassadors.⁹

The video for LittleCharm's first product, a baby nose aspirator, must be short and catchy with cheerful children's music playing in the background. There are no existing advertisements for this specific product, so the possibility of starting a trend opens up. The video must show the problem (the child's stuffy nose), the solution to the problem (the manual aspirator), how to use it, how to wash it, and finally a picture of a happy child.

Video development:

1. A baby with a runny nose is crying, nervous (sad music),
2. Display of the product in the mother's hands,
3. The mother sucks the baby's nose (awake and in sleep) and baby starts laughing (happy music),
4. The mother washes the aspirator under running water and puts it in the sterilizer.

Branding

Brand is a combination of name, sign, term, symbol and design that determines the business and makes it recognizable. It is the main permanent asset of the business that outlives the company's specific products and facilities. A brand is a powerful asset that needs to be carefully developed and managed. It is extremely important for differentiation from the competition, and it provides a guarantee of reliability and quality. The vast majority of products on the market are marked with a brand in order to make the purchase more efficient and to redirect the customer's attention to new products of that brand. The customer ties his emotions and experiences to the brand, and it is found in his consciousness. It facilitates the processing of orders for the supplier, provides legal protection, market segmentation and the possibility of attracting a loyal and profitable circle of clients. Strong brands have high market value or brand equity. It is the positive differential effect that knowing the brand name has on the client's reaction. It increases gradually and parallel with greater brand loyalty, the degree of familiarity, perception of the quality and strength of association. The brand name must be clear, legible, memorable and related to the product.¹⁰ The brand is in the consciousness of the consumer. It occupies a place in their mind and creates an emotional connection between the customer and the product or brand. This association created by the customer is the basis of brand positioning and branding itself. It is a complex symbol that includes properties, characteristics, benefits, values, culture and personality.¹¹

The name of the business LittleCharm translates as little lucky charm, little happiness. Despite the fact that influencers imposed the "beige mom" trend of neutral colors in children's products and stores, most parents still prefer brightly colored products because they are more interesting to children. This is exactly why the colors of the LittleCharm brand are cheerful, and the font is gentle, handwritten.

The typographical part of the logo is a hand-drawn crown that resembles a child's drawing, surrounded by colorful confetti that symbolize the child's movement or energy. The slogan "Be charmed!" is written in a playful, unaligned font. The colors used in creating the logo are green, pink, yellow, blue and red. The logo is complete with the typographic and graphic part of the sign. By adding your own domain (litttlecharm.store/) instead of the one automatically provided by Shopify, it will increase the possibility of finding the webshop through search engines and gives the characteristic of a credible business. Likewise, when choosing a payment method, it is good to use the same email address for Paypal as for Shopify and AutoDS. At LittleCharm, the email is LittleCharmCRO@outlook.com, and the same email is used for Paypal because these two platforms are automatically connected.

Business defines a product according to certain values that they want the consumers to associate the product with and place it in their consciousness. Due to the overwhelming saturation of products, consumers sort products into categories to make it easier to make a purchase decision. There are three positioning alternatives. The first is to strengthen the current position, the second is to look for a vacancy and the third is to depose or reposition. Some businesses develop multiple differences that they promote, and some develop a unique selling proposition.¹² The LittleCharm business uses another positioning alternative which is searching for free place. This free space means a place in the customers conscience where the brand can be positioned. The focus is on positioning in the consumer's mind as a specialized webshop that offers interesting gadgets and educational and fun toys. The vast majority of stores with baby equipment offer, among other things, furniture, clothes, dishes, etc. Because of their extensive but shallow offer, various popular products that come out on the market are missed and not included in their offer. The best option would be to add a completely new, innovative product to the offer in addition to the existing products. Also, a big role in branding has the packaging. The AutoDS platform offers the dropshipper the option to automatically put a label with the dropshipper's logo on the products they send. In this way, additional customer loyalty and a note of greater professionalism are created.

Customer service serves as an additional service to customers before and after purchasing a product. It increases the loyalty and credibility of the business. With this service, the expected product is expanded and a greater competitive advantage is achieved. Keeping existing customers happy is a lower cost than attracting new customers or winning back lost customers. Businesses with a high level of customer service can charge more, grow faster

and make more profit.¹³ Customer service for LittleCharm will be available to them at any time of the day, and an automatic message will be sent to each of their emails first to notify them of the received email and that the response will be sent as soon as possible. Customers will easily find information on delivery, company policy, about us page on the webshop itself. These elements will increase their security in the business itself.

Due to the need to shorten the time for forwarding orders and customer information, automation was introduced. The goal is to focus the saved time on larger aspects of the business. It is achieved using various tools and software, and some opt for virtual assistants. Automation includes automatic addition of products to the store process, job optimization, inventory management software, automatic order processing, automatic customer feedback, automatic product tracking and protection of own stores.¹⁴ A virtual assistant can help or do any business activity independently. Some of these activities are customer service, store management, bookkeeping and data entry, making pre-prepared and arranged calls (cold calls), research conducted to find specific data etc.¹⁵

CONCLUSION

The goal of this Final paper was to open a dropshipping business in practice and show every step from opening a business to selling products, to make a guide for dropshipping. The opening of the LittleCharm webshop is a concrete example tested in order to determine the working hypothesis, which is the question of the ease of opening a dropshipping business. The conclusion is that it is not complicated to become a dropshipper and to choose a product. At the same time, most products have an elaborate promotion that can be imitated, but those products that are new on the market or not currently popular and highly hyped will always stand out more. With good marketing, they can become trendsetters.

The survival of a dropshipping business depends on persistence, frequent product searches, good marketing and constant expansion of knowledge. Like any business, it takes time and effort for progress.

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SHAPING LEADERS THROUGH REFLECTION: COMPARISON OF A FREE-FORM AND AI-GUIDED REFLECTION IN LEADERSHIP DEVELOPMENT PROGRAMMES

Anja Gorše¹ and Anja Svetina Nabergoj²

Abstract:

Does the reflection method matter? In this paper, we compared Free-form and AI-guided reflection, using the tool Riff. The study explores which reflection method is more effective in uncovering key leadership development themes, such as surprise, frustration and failure, which were associated with formative leadership experiences. Using a mixed-method design, participants' reflections were thematically analyzed. The results indicate that AI-guided reflection performed better in uncovering key leadership development themes compared to Free-form reflection. Suggesting that AI-supported reflection deepens the reflection process and helps emerging leaders generate richer insights. Integrating such tools into leadership development programs might enhance self-awareness and contribute to improved individual and organisational performance.

INTRODUCTION

Today's business environment is always changing, needing leaders to be adaptive and sensitive to continual learning demands. The complexity of this environment confronts leaders with everyday challenges that, if reflected upon, may turn into significant chances for growth and skill development (Wood Daudelin, 1996). However, reflection seems to decline with increasing years in practice and is frequently weaker in contexts where reflective thinking is not reinforced and the time constraints in busy environments might function as a barrier to reflection (Mann et al., 2007). Leadership consultancies throughout the world observed the trend that many leaders suffer from "busyness," leaving them with little time for introspection and creativity. This lack of reflection space makes it difficult for leaders "to make sense of" and "act in the face of the complexity and uncertainty of the world" (Gutmann, 2024).

These insights highlight the need to develop reflective practice into a habit for emerging leaders, as everyday routines can become automatic, leaving little space for critical examination. Furthermore, even current leaders frequently struggle with self-reflection initially, because traditional educational and professional models do not consistently emphasize this skill (Roberts, 2008). Incorporating reflection into leadership development programs helps leaders reach their full potential by enabling them to assess their experiences strategically (Densten & Gray, 2001).

Many of the key developmental experiences for leaders occur in the workplace, emphasizing the need to reflect on these activities. The Center for Creative Leadership examined 616 experiences of 191 successful executives and identified 16 types of "key events"—such as starting something from scratch, stabilizing, or turning around a failing operation—that contribute significantly to competency development (Lindsey et al., 1987). These experiences, as "favourite and potential sources of experiential learning," allow leaders to achieve challenging tasks independently, fostering a spiralling process of growth not only in task competence but also in self-confidence and a willingness to take on new challenges (Larsen, 2004). Reflection on these types of experiences enables leaders to extract lessons that would otherwise go unnoticed, particularly when they involve themes such as surprise, frustration, and failure, which are especially important in professional development and building effective leadership (Bailey & Rehman, 2022). Existing research highlights that reflective practice develops fundamental leadership characteristics such as self-awareness, self-confidence, and empowerment, all of which contribute to personal growth and effective leadership (Roberts, 2008). Not only that, research shows that regular reflection can contribute to an increase in performance of up to 20% in individual practice and 20-25% in group practice (debriefing) (Di Stefano et al. 2014; Tannenbaum & Cerasoli; 2012). Meaning that reflective, self-aware leaders can improve both individual development and organizational performance through open self-evaluation, which allows leaders to assess strengths, and address weaknesses, as well as build the trust and commitment required for good team dynamics (Castelli, 2016; Han, 2023).

Experiential Learning and Reflection

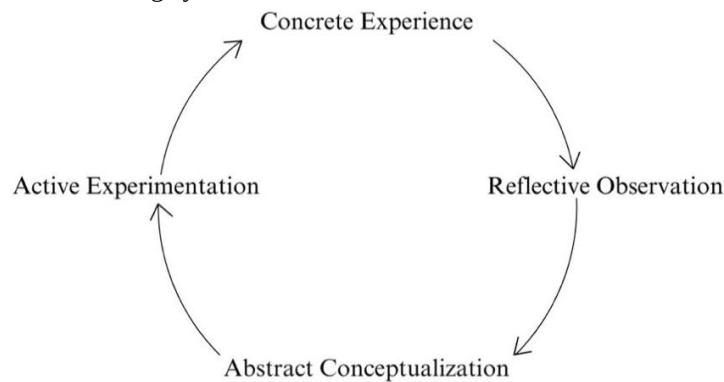
Kolb (1984) defines experiential learning as "a process whereby knowledge is created through the transformation of experience." According to Kolb's model, learning occurs cyclically in four stages, as seen in Figure 1, these are: concrete experience, reflective observation, abstract conceptualization, and active experimentation.

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Individuals gather information through concrete, direct experience, afterwards, they analyse and contemplate it, leading them to conceptual insights and conclusions from the experience, and finally apply the new knowledge in practice. The main part of the cycle is reflective observation which is necessary for the beginning of the cycle and the learning outcome.

Figure 1: Kolb's experiential learning cycle



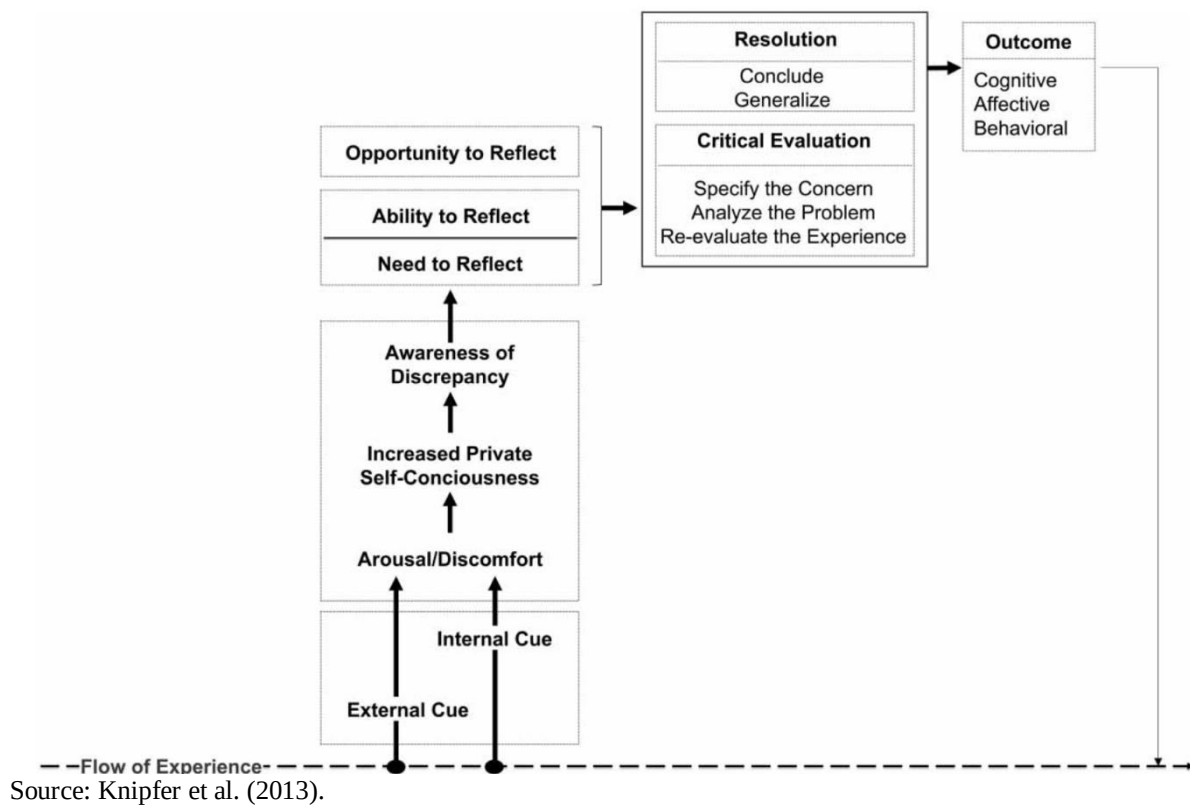
Source: Own work (2025).

Kolb's theory of experiential learning offers an integrative approach that synthesizes key insights from different learning theories. Each phase of the cycle corresponds to a different learning process. The first phase of experience is based on the role of sensory perceptions, while the reflective observation is influenced by learning based on self-awareness, and self-knowledge, especially in the context of social, economic, and political factors. Cognitive approaches shape the foundation of abstract conceptualisation, while behaviourist approaches influence active experimentation (Kayes and Kayes, 2021). The model acknowledges the intersection of individual development with socio-economic and political systems and promotes holistic growth by bridging the sensory, emotional, cognitive, and intuitive aspects of personality (Marentič Požarnik, 2021).

Theoretical perspectives of reflection vary, these perspectives include the constructivist, constructivist-developmental, psychoanalytical, situative, critical-cultural, and activist views (Shea et al., 2016; Thompson & Pascal, 2012). In this paper, the focus is placed on the constructivist approach, which views reflection as a meaning-making process developed through the individual's active engagement with experience. This approach is among the most widely adopted in academic literature and professional practice. According to Shea et al. (2016), the constructivist perspective defines reflection as the construction of new understandings and interpretations based on experience. It is considered a conscious and explicit process that helps individuals organize thoughts, examine actions, and plan for future development.

Reflection can be triggered in two ways – intentionally or in moments of disruption. Lundgren et al. (2017) emphasize reflective activity is intentionally triggered—through noticing, reviewing, interpreting, framing, generalizing, and applying metacognitive strategies. While individuals construct meaning independently within a broader learning context, reflection operates as a separate, metacognitive layer that supports this meaning-making. On the other hand, Dewey (2007) and Knipfer et al. (2013) suggest that reflection begins when people are either “struck” by a new experience or get “stuck” in a situation that contradicts what they already know. It is often triggered by moments of tension, discrepancy, or when existing routines are disrupted— such as when an individual encounters unexpected outcomes, ambiguous information, or social conflict. These disruptions create a sense of dissonance that prompts individuals to question their assumptions, catalyzing and motivating reflective inquiry. This state of arousal, often emotional, increases conscious awareness and supports initiating the reflective process. This process, graphically presented in Figure 2, begins when internal or external cues—such as emotional discomfort or environmental signals—evoke arousal and unease. This leads to increased awareness of a discrepancy between expectations and actual outcomes, which generates the perceived need to reflect. When the individual has the opportunity, ability, and motivation to reflect, they enter a cognitive phase of critical evaluation, during which they specify concerns, analyze the issue, and re-evaluate the experience. This is followed by resolution, where insights are concluded and generalized. The outcomes of this process can be cognitive, affective, or behavioural, demonstrating how reflection transforms emotional tension into meaningful learning and development.

Figure 2: Initiation of reflective episode



Such emotionally charged moments that can be reflection triggers were also found to be valuable in a leadership development context, particularly those involving themes such as surprise, frustration or failure. Bailey and Rehman (2022) did a study where they asked 442 executives to reflect on which experiences were the most formative for them as leaders. What they found is, that there were three distinct themes present in their analysis: surprise, frustration, and failure. Reflections that involved one or more of these sentiments proved to be the most valuable in helping leaders learn and grow in their careers.

Research purpose and question

We investigated the differences between free-form and AI-guided reflective approaches to determine which strategy is more effective in developing reflective capacity among young professionals and which should be used to accompany them in their leadership development.

RQ: Do reflections involving themes such as surprise, frustration, and failure differ in frequency and impact between AI-guided and free-form reflective groups?

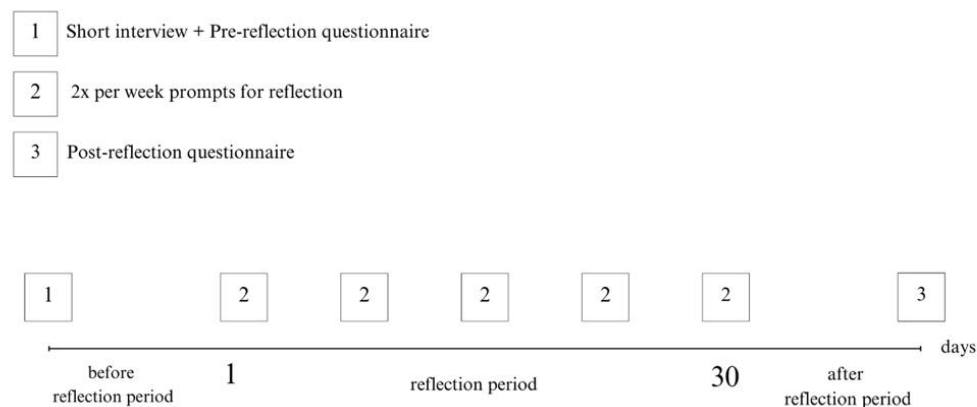
RESEARCH DESIGN AND METHODOLOGY

The research employs a mixed-methods approach, incorporating both quantitative and qualitative data. Quantitative data was collected at two time points: before and after the reflection period with the Reflective Practice Questionnaire (RPQ) (Priddis & Rogers, 2017). On the other hand, two types of qualitative data were gathered – semi-structured interviews and the reflections written by participants. The semi-structured interviews served three main purposes. First, they provided insights into the challenges participants face in their leadership roles and the areas in which they would like to improve. This helped to understand their developmental needs and motivations. Second, participants were asked about their existing reflective practices – how frequently they reflect, under what circumstances, and what methods they typically use. Lastly, the interviews helped build trust, creating a foundation for participants to feel more comfortable sharing personal thoughts and experiences in their written reflections. All interviews were conducted individually via Zoom, providing a one-on-one setting to encourage open and honest conversation. While a consistent set of primary questions led the interviews, the semi-structured format provided flexibility, including follow-up or probing questions to go further into participants' responses.

The other qualitative data were participants' reflections, which were analyzed for the presence of specific topics, such as surprise, failure and frustration, which are expected to play an important role in leadership development based on the findings of Bailey and Rehman (2022).

The research timeline is shown in Figure 3. The process began with the pre-reflection questionnaire, followed by a short (20-minute) individual interview. Over the 30-day reflection period, participants received 10 reflection prompts (two per week) on the same days and hours (Tuesdays and Thursdays in the morning), concluding with a post-reflection questionnaire. The 30 days was selected as a motivating and realistic timeframe, supported by Lally et al. (2010), who suggest that habit formation typically begins within 18 to 254 days. This duration also served as a motivational element, encouraging participants to view reflection as a potential habitual practice.

Figure 3: Research timeline



Source: Own work (2025).

Participants and Sampling

The study initially included 40 participants, of whom 33 completed all required steps within the given timeframe, 20 females and 13 males. Participants were young professionals, the majority were enrolled in Executive MBA and worked in C-level positions or management. While the minority did not occupy formal leadership positions, all participants had experience leading and managing people and were actively engaged in such responsibilities at the time of the study. On average they have 16.4 years of work experience and an average of 4.1 years in their current positions. Their self-assessed ability to reflect was 3.8 on a 6-point scale (3 - I sometimes reflect, though not consistently or deeply, 4 - I regularly think about my experiences and draw insights).

In the research, self-selection sampling was employed, where individuals voluntarily chose to participate in a study after being invited via e-mail. The approach was appropriate, given the nature of the study – focused on reflection and personal leadership development, as intrinsic motivation is an innate desire to explore, master and seek out novelty aligning with participants' curiosity and desire for improvement (Fishbach and Woolley, 2022).

Participants were randomly divided into two groups – one was engaged in an AI-guided reflection and the other reflected in a free-form way. In the end, 16 participants had completed the free-form reflection, while 17 participants finished the AI-guided reflection.

Reflection Conditions: Free-form vs. AI-guided reflection

Reflection can take many forms, ranging from free-form reflection to structured approaches. Free-form reflection allows individuals to explore their thoughts and feelings without imposed structure, promoting self-exploration, and leading to the exploration of unexpected themes or areas of learning. However, free-form reflection might reduce student effort, as the absence of specific guidelines may lead some students to write reflections that lack depth, length, or critical thought (Sturgill & Motley, 2014). In contrast, structured reflection guides individuals through specific questions or prompts and is better at promoting personal growth and self-efficacy. For example, studies found that students who engaged in structured reflection reported significantly higher levels of personal development compared to those using unstructured methods (Sanders et al., 2015).

The paper in general compares free-form and structured reflection, However, the comparison required some adaptation of the methods to balance engagement, effectiveness, and comparability. Rather than a completely free-

form reflection where participants write without any guidance, the “free-form” condition in this study used a semi-structured approach: participants were presented with reflective questions but were explicitly encouraged to follow their thoughts and use the questions only as inspiration. Each prompt included the sentence: “Feel free to follow your thoughts and use the questions as inspiration.” This approach allowed participants freedom while providing subtle guidance. Participants in the free-form group received a link via e-mail to a Google Form where they could write down their reflections without any word limit as shown in Figure 4. After completing each reflection, they received a copy of their submission via e-mail, allowing them to review and further process their thoughts.

Figure 4: Google Form a Free-form reflection tool

Source: Own work (2025).

On the other hand, the “structured” reflection condition was operationalized as AI-guided reflection using the AI tool Riff showed in Figure 5, developed at Stanford University specifically for pedagogical and professional reflective purposes. This tool guided participants through a dynamic conversational process, offering structured prompts tailored to their responses which allowed flexibility in the direction of the reflection. This method combined the benefits of structure with adaptive, personalized interaction. Participants similarly to the free-form group received a link via email and received a copy of their submission by e-mail.

Figure 5: Riff an AI-guided reflection tool

Source: Own work (2025).

RESULTS

Reflections were reviewed and assessed to determine whether they contained any of the three themes: surprise, frustration or failure. A single reflection could include all three themes, only one or two, or none at all – this varied depending on the participant. The themes were identified based on the definitions provided by Bailey and Rehmen (2022). A binary assessment method was used: if a theme was present in a reflection, it received one point in the corresponding category e.g., if surprise was present, the reflection received one point for the ‘surprise’ theme. At the end of the process, points were summed separately for each theme and compared between the free-form and AI-guided reflection groups.

Surprise was identified as a moment of “shock”, that occurred when expectations, based on past experiences were disturbed, either because something unexpected happened or something anticipated did not occur. As humans we

are inclined to hypothesize about what will happen next, for this, we use logic and reason to describe, explain and predict to maintain control over our environment (Bailey and Rehman, 2022). Some reflections expressed surprise explicitly, such as: “I was negatively surprised by the outcome.” Others were more indirect, as in: “Now I just realized that maybe I need to present him one additional view of how this document will be useful.”

The theme of failure was identified when participants recognized that there was made a mistake, which provided them an opportunity to learn. While surprise is often an internal response, failure is typically visible and closely linked to our behaviour (Bailey and Rehman, 2022). One participant reflected: “I was not as assertive as I should be, and I was just saying ok for the conversation to pass as soon as possible.” Another stated: “But it turned out that I didn’t focus enough on each of their tasks and deeper explain what are they, how to do it etc. So next time I will spend more time with each of them separately on their part of the project and probably follow up in that way.”

The last theme was frustration, which was recognized when participants felt their progress toward a goal was blocked. This emotional experience often creates a sense of being stuck or unable to achieve the desired outcome (Bailey and Rehman, 2022). Participants expressed this sentiment directly, as in: “I was frustrated with the situation that had gone poorly” or “I felt very angry.” As well as, indirectly as in: “Usually there are no major questions. Which bothers me. Because I’m not always sure they understood it.”

To determine whether there were statistically significant differences in the frequency of themes between the two groups, a Pearson’s Chi-Square test was conducted for each of the three themes (surprise, frustration, and failure). This test assessed whether the distribution of thematic content differs significantly depending on the type of reflection method used. In addition to statistical significance, effect sizes were calculated using Cramer’s V statistics, providing insight into the strength of the association between the reflection method and the presence of each theme.

Before performing Pearson’s Chi-square tests, assumptions were evaluated. First, all observations were independent, as each participant’s reflection was assessed separately and contributed only once to each category. Second, the assumption regarding expected frequencies was met for all three themes – surprise, failure and frustration – with all expected frequencies greater than 5. Given that each analysis involved a 2x2 contingency table (theme absent vs. present across two groups), Yeats continuity correction was applied to adjust for potential overestimation of statistical significance in small samples.

The result of the analysis assessing whether the presence of the theme surprise differed significantly between the AI-guided and free-form groups showed a statistically significant difference between the groups, $\chi^2(1, N = 330) = 6.68$, $p = 0.0097$. This indicates that the AI-guided group was more likely to include surprise in their reflections. Specifically, 11.2% of reflections in the AI-guided group contained this theme, compared to 5.2% in the free-form group. The contingency table of observed frequencies is presented in Table 1.

To estimate the strength of this association Cramer’s V statistics showed a value of 0.14, suggesting a small effect size based on the criteria by Funder (2019).

Table 1: Frequency of theme ‘surprise’ in reflections

Reflection method	Absent theme	Present theme
Free-form	143	17
AI-guided (Riff)	133	37

Source: Own work (2025).

The next analysis was performed to determine whether the presence of the theme failure differed significantly between the AI-guided and free-form reflection groups. The results showed that there is a statistically significant difference, $\chi^2(1, N = 330) = 6.41$, $p = 0.0114$, which indicates that participants in the AI-guided group were more likely to reflect on failure. Specifically, 20.6% of reflections in the AI-guided group contained the theme failure, compared to 12.7% in the free-form group. The contingency table displaying the distribution of reflections with and without the failure theme across both groups is presented in Table 2.

To assess the strength of this association, Cramer’s V statistics showed a value of 0.14, which represents a small effect size according to the criteria by Funder (2019).

Table 2: Frequency of theme ‘failure’ in reflections

Reflection method	Absent theme	Present theme
Free-form	118	42
AI-guided (Riff)	102	68

Source: Own work (2025).

Lastly, the frequency of the theme frustration was checked across the AI-guided and free-form reflection groups. The analysis showed a statistically significant difference between the groups, $\chi^2(1, N = 330) = 26.55, p < .001$, suggesting that frustration was significantly more common in the reflections of the AI-guided group. Specifically, 34.5% of reflections in the AI-guided group contained this theme, compared to 18.5% in the free-form group. As with other themes, the contingency table summarising the frequency of frustration in each group is provided in Table 3.

The strength of this association based on Cramer’s V statistics is the value of 0.28, indicating a medium effect size based on the criteria by Funder (2019).

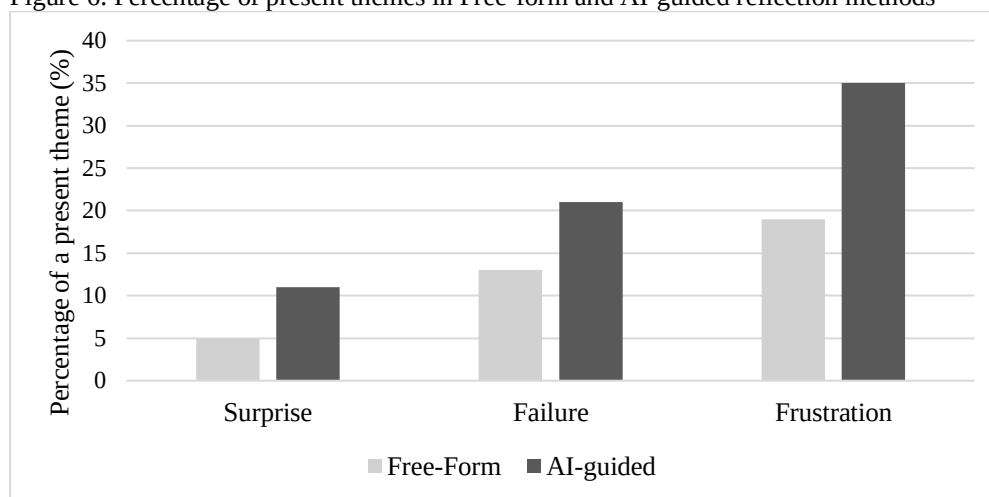
Table 3: Frequency of theme ‘frustration’ in reflections

Reflection method	Absent theme	Present theme
Free-form	99	61
AI-guided (Riff)	56	114

Source: Own work (2025).

Based on the results, it can be concluded that all three themes – surprise, failure and frustration, appeared with statistically significant differences between AI-guided and free-form reflection groups. While surprise and failure had a small effect size, the presence of theme frustration had a medium effect size, indicating that the reflection method had a more substantial impact on its occurrence. Reflection supported by AI guidance revealed a higher frequency of these key learning themes shown in Figure 6, suggesting that this method encourages deeper thinking and analysis. Since these themes are associated with formative leadership experiences, the AI-guided approach appeared more effective in stimulating the kind of reflective insight that supports leadership development, learning, and long-term growth.

Figure 6: Percentage of present themes in Free-form and AI-guided reflection methods



Source: Own work (2025).

CONCLUSION

This study aimed to explore how reflective practice can support leadership development, particularly among emerging leaders. The findings from the thematic analysis showed that the AI-guided reflection group had a statistically significant higher frequency of themes linked to leadership development (failure, surprise, and frustration). This implies that AI suggestions provided by Riff allowed participants to go deeper and not only uncover but also assist them in connecting and articulating experiences that include themes like failure, surprise, and frustration. These findings imply that integrating structured, guided reflection tools like Riff may enhance the impact of experiential learning, which is usually employed as an education method in adult education.

While the majority of the participants were part of leadership educational programs, not all were. Direct collaboration with a program would allow for more targeted insights into how reflection supports the translation of learning into practice. Future research could explore how AI-guided reflection tools, such as Riff, benefit both learners and educators by making developmental progress more visible and connected to workplace challenges. Incorporating such reflection could further strengthen its impact on self-awareness, performance, and leadership growth.

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INDIVIDUAL ENTREPRENEURIAL ORIENTATION FOR ENTREPRENEURIAL READINESS: A SURVEY OF GRADUATING STUDENTS AT TVET COLLEGES IN NIGERIA

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Abstract:

Low business start-ups due to poor entrepreneurial competence among the youth have continued to attract the interest of entrepreneurship educators and practitioners. Previous investigations have explored individual entrepreneurial orientation, with little attention given to entrepreneurial readiness of students from TVET colleges in Nigeria. This research shortcoming forms the motivation for this study. The study aims to explore the effect of Individual Entrepreneurial Orientation (IEO) components on students' entrepreneurial readiness for business start-ups. The philosophical approach is framed within the positivist perspective, with a survey of 289 exit level students as the sample size. The Kaiser-Meyer-Olkin test and Bartlett's test were performed to measure the sample adequacy. Pearson correlation and regression analysis were conducted to validate the hypotheses. The results indicated that IEO risk-taking shows an insignificant association with the students' entrepreneurial readiness, while IEO innovation and IEO proactivity show a significant association with the students' entrepreneurial readiness. The study further reveals that there is no gender difference in the students' entrepreneurial readiness as influenced by IEO toward starting a business. Managerial implication suggests the integration of IEO components with the TVET entrepreneurship scheme of work with practical translations.

Keywords: risk-taking, innovativeness, proactivity, entrepreneurial readiness, business start-ups, individual entrepreneurial orientation, youth unemployment.

INTRODUCTION

The youth population in Nigeria is said to be about 140 million and estimated at 65% of the total population in 2018 (ITA and Bassey, 2022). According to the National Bureau of Statistics (2020), over 120 million youth were unemployed in the same year. Accordingly, about 90% of graduates annually in Nigeria are faced with the challenge of unemployment Adeniyi et al. (2022). In the third quarter of the year 2022, while the youth unemployment rate stood at 33.5%, the unemployment rate was estimated at 33%, up from 32.5% in 2021; and this is expected to rise to 40% in 2023, and to 44% in 2024 (Sasu, 2022)⁴. The high youth unemployment rate may be attributed to the inadequate readiness to engage in entrepreneurial activities. Entrepreneurship is known to increase employment opportunities and economic growth of any nation including Nigeria (Ilevbare et al., 2022). Besides, the promotion of business start-ups among the youth is evident in the reduction of unemployment and poverty (Koen, Rahuman, and Bogiatzis, 2018).

Recent study suggests that increase in unemployment occurs due to individuals lack of courage to engage in high-risk activities such as entrepreneurship (Wulandari et al., 2021). Empirical evidence indicated that risk-taking is associated with successful entrepreneurs (Zaleskiewicz et al., 2020), and innovation is referred to as entrepreneurship (Schumpeter, 1974), while proactivity is an influential construct of an entrepreneur. Risk-taking, innovation and proactivity are predominant IEO postures that have been demonstrated in assessing entrepreneurial behaviours (Adeniyi, 2021; Chow and Hock, 2021). Few studies have explored IEO construct among young people in Nigeria. For instance, through a repeated-measure t-test, Otache et al. (2022) found increased level of IEO among students of higher education after being exposed to entrepreneurship education. A significant and positive relationship was found between innovation, proactivity, and performance of SMEs (Yunusa et al., 2022). However, the study on women entrepreneurs in North-Western part of Nigeria found that IEO in terms of risk-taking, innovation and proactivity show insignificant relationship with women entrepreneurs' success (Hashimu, 2018). An insignificant association was also indicated between IEO risk-taking and students' entrepreneurial preparedness in Nigeria (Adeniyi, 2021). This inconsistency suggests the need for further investigation in identifying essential IEO components that can foster entrepreneurial readiness among young individuals in Nigeria. Extant literature revealed that risk-taking, innovation and proactivity are critical factors of entrepreneurial success (Nikitina et al., 2023). A change is therefore required by encouraging young individuals in Nigeria to become entrepreneurially ready for business creation. A person with entrepreneurial readiness is believed to have

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Reliability of African datasets is a highly a contested area of research (see, for example, the work of Jerven, 2010, 2013; Jerven and Johnston, 2015 for different viewpoints).

a high-risk for starting a business. Therefore, this study aims to assess the entrepreneurial readiness of the exit-level students at selected TVET colleges by focusing on the following objectives:

1. To determine the influence of IEO risk-taking on students' entrepreneurial readiness for business creation.
2. To examine the impact of IEO innovation on students' entrepreneurial readiness for business creation.
3. To examine the impact of IEO proactivity on students' entrepreneurial readiness for business creation; and
4. To establish whether IEO reflects any gender differences in students' entrepreneurial readiness for business creation.

Entrepreneurship construct

Entrepreneurship is a multidimensional concept which is transdisciplinary in nature and, as such, entrepreneurship has no generally agreed-upon definition (Derera, Croce, Phiri and O'Neill, 2020; Ferreira, Fayolle, Fernandes and Raposo, 2017; Barringer and Ireland 2012; Westhead, Wright and McElwee, 2011). For example, the economists view entrepreneurship as an input that is added to land, labour, and capital to extend the theory of production, and to complete the explanation of the four types of income: profit, rent, wages, and interest (Westhead *et al.* 2011). This school of thought views entrepreneurial activities as the introduction of novelty and innovation to new work practices, new products and services, and new venture creation (Ferreira *et al.* 2017; Westhead *et al.* 2011). Sociologists, on the other hand, believe that entrepreneurship exists within a social context which shapes an individual's propensity to become an entrepreneur (Westhead *et al.* 2011; Storey and Greene 2010). The psychological approach explores issues relating to the entrepreneur, the decision-making process, and the choices they make in entrepreneurship (Ferreira *et al.* 2017; Westhead *et al.* 2011). Researchers in this field have also explored personality traits of entrepreneurs and the behaviour of successful entrepreneurs (Ndoro and Van Niekerk 2019; Ferreira *et al.* 2017; Westhead *et al.* 2011). Notable traits highlighted in literature are a risk-taking propensity, a strong need for achievement, a locus of control, and a need for autonomy, amongst others (Ndoro and Van Niekerk 2019; Kuratko Morris and Schindehutte, 2015). The socio-psychological approaches consider the context in which the entrepreneur is operating, and its characteristics (Westhead *et al.* 2011). The researchers argue that some social contexts are likely to promote entrepreneurial behaviour, whilst others are not (Westhead *et al.* 2011). The socio-cognitive approaches view entrepreneurship from the personality and behaviour of an entrepreneur stemming from both social interactions and personal characteristics (Ndoro and Van Niekerk, 2019; Storey and Greene, 2010). This approach suggests that the behaviour of individuals changes throughout their life, with their interactions with specific reference groups in different social contexts shaping their personalities (Ndoro and Van Niekerk, 2019). However, this approach acknowledges that personality traits may be difficult to change (Kuratko *et al.* 2015; Westhead *et al.* 2011). This study draws from the aforementioned theoretical approaches of entrepreneurship to explore the entrepreneurial readiness of the graduating students. The study argues that psychological attributes or cognitive factors associated with an individual must be stimulated to promote entrepreneurship.

Scholarships in entrepreneurship education have emphasised various factors that contribute to the development of a nascent entrepreneur. Of utmost importance is the entrepreneurial orientation of an individual (Sanchez, 2013; Koe, 2016). Entrepreneurial orientation has been defined as a company's ability to engage in entrepreneurial behaviours that reflect innovation, proactivity, risk-taking, competitive aggressiveness, and autonomy, leading to change in the business space (Voss, Voss and Moorman, 2005). It has been advanced that the meaning and dimensions associated with entrepreneurial orientation lack significant difference from the representation of individual entrepreneurial orientation, because the features of an entrepreneurial organisation also apply to individuals (Gabriel and Kobani, 2022). Based on this premise, entrepreneurial orientation refers either to a company's decision-making process to act entrepreneurially, or to an individual's personality traits, attitudes, and attributes related to entrepreneurial activities (Eniola 2020; Covin, Rigtering, Hughes, Kraus, and Bouncken, 2020). Accordingly, the components of IEO such as risk-taking, innovation and proactivity have been found to increase entrepreneurial activities of individuals (Nikitina *et al.*, 2023). Moreover, the study of entrepreneurial orientation at the individual level has proven beneficial to future business owners (Bolton and Lane, 2012; Goktan and Gupta, 2015) and this has given rise to the concept of individual entrepreneurial orientation (IEO).

LITERATURE REVIEW

Entrepreneurial Orientation

Miller (1983) views entrepreneurial orientation as the attributes and philosophy of a company measured by top-management decision-making strategies on entrepreneurial goals. Luu and Ngo (2019) state that EO is the chain of entrepreneurial behaviours of a business when introducing new production techniques, new processes, when manufacturing a new product line, and when accessing new market opportunities. Adebayo (2015) has described

EO as the dynamic components and structure of a company when moving from a conservative orientation to one fully entrepreneurial. Lyon, Lumpkin and Dess (2000) conceptualised EO as the process and decision-making attitudes of an entrepreneur when engaging in entrepreneurial activities. Accordingly, these processes and components have been conceptualised into various entrepreneurial behaviours, such as risk-taking, proactivity, innovation, aggressive competition, and autonomy (Covin, Rigtering, Hughes, Kraus, Cheng, and Bouncken, 2020). In addition, Gabriel and Kobani (2022) affirmed that EO involves a set of distinct but related entrepreneurial components embedded in qualities of risk-taking, innovation, proactivity, competitive aggressiveness, and autonomy.

These dimensions of EO have paved the way for the determination of EO at the individual level. Accordingly, Bolton and Lane (2012) argued that EO can be determined at an individual level considering its multiconstruct components. This underscores the importance of IEO as a behavioural phenomenon driving the entrepreneurial quest (Bolton and Lane, 2012).

Individual Entrepreneurial Orientation Constructs

IEO is conceptualised by Bolton and Lane (2012) as representing entrepreneurial cognitive traits such as risk-taking, innovativeness, and proactivity. IEO emphasises individuals' orientation of activating these skills to make business decisions. The potential of risk-taking ability, innovation, and proactivity has been strongly linked to entrepreneurial success (Koe, 2016). Further, IEO is a behavioural component of entrepreneurship for entrepreneurial pursuit (Bolton and Lane, 2012). This assumption underscores the determination of these skills at individual level for nascent entrepreneurs.

Risk-taking

Risk-taking is the ability to make decisions in the face of information shortages. Risk-taking activities involve borrowing heavily for business purposes, entering unknown markets, and committing a huge percentage of economic resources to a project with uncertain results (Adebayo, 2015). Risk-taking may be viewed as the extent to which an individual is willing to make a high business commitment, which justifies the nature of an entrepreneur to engage in bold rather than cautious actions (Gabriel and Kobani, 2022). Previous research has shown that successful entrepreneurs often assume risky actions, and also adopt planning and forecasting strategies to limit uncertainty (Covin *et al.*, 2020). Risk-taking ability is a critical entrepreneurial attribute for business creation. Accordingly, risk-taking skills have been found to increase innovation for business (Craig *et al.*, 2014).

Proactivity

Proactivity is the process of projecting or anticipating, and responding to future demands (Lawan and Fakhrul, 2015). Proactivity refers to a forward-looking step and opportunity-seeking perception which deals with the introduction of new products and services ahead of competitors; also acting in expectation of future needs to create a change in the business environment. The construct of proactivity as a component of EO that has been well explored in the field of entrepreneurship scholarship (Bolton and Lane, 2012; Luu and Ngo, 2019; Eniola, 2020).

Innovation

Innovation is a key characteristic of a successful entrepreneur. Innovation refers to the demonstration of new ideas, unique originality, and creative improvement in existing products or services; also, in the manufacturing of new products (Ibrahim and Abu, 2020). Innovation involves building on existing ideas to create improved business; while disruptive innovation requires new skills or ideas, which may leave existing skills outdated (Gabriel and Kobani, 2022). Innovation is a key component required for business enterprise in achieving entrepreneurial success. This is because innovation is associated with new ideas, new products, and new technology.

Nexus between EO and IEO

While EO is associated with the assessment of entrepreneurial behaviours of firms, IEO could be described as the measure of EO at individual level. It should be noted that risk-taking, innovation, and proactivity are the most investigated dimensions of EO and IEO in entrepreneurship literature (Robinson and Stubberud, 2014; Koe, 2016; Nikitina *et al.*, 2023). In similar vein, risk-taking, innovation, and proactivity are the most predominant components shown in existing studies of EO as having a valid and reliable impact. However, most of these investigations have measured IEO against entrepreneurship education and business performance (Aminu, 2016; Shamsudin *et al.*, 2017; Bandera *et al.*, 2018; Covin *et al.*, 2020). There is limited research on the link between IEO and students' entrepreneurial readiness, particularly among students of TVET colleges in Nigeria. The low level of business

start-ups among young minds in Nigeria necessitates the urgent need to assess the most stimulating IEO posture towards starting a business. Therefore, this study aims to determine the impact of risk-taking, innovation, and proactivity on students' entrepreneurial readiness at selected TVET colleges in Nigeria.

Entrepreneurial readiness

Entrepreneurial readiness has been conceptualised as an individual's ability or willingness to take entrepreneurial action (Coduras et al., 2016). "Entrepreneurial readiness is an individual's cognitive attributes of capability and willingness to direct behaviour in an entrepreneurial context" (Lau et al., 2012, p. 147). Accordingly, entrepreneurial readiness is measured by an individual's overall ability to respond to entrepreneurial activities (Darmasetiawan, 2019). This suggests that entrepreneurial readiness is a collection of cognitive attributes required for entrepreneurial success (Pramoto et al., 2018). Various studies have been conducted to demonstrate the relationship between IEO and entrepreneurial readiness. For example, technological readiness and IEO (Penz et al., 2017), IEO and readiness for change (Kurniawan et al., 2017; Soetjipto et al., 2022), instrumental readiness and EO (Dakhan et al., 2022). It is important to state that the investigation on the effect of IEO dimensions (in terms of risk-taking, innovation and proactivity) on students' entrepreneurial readiness in Nigeria is underexplored.

IEO and Entrepreneurial Readiness; and Hypotheses Formulation

A considerable number of studies have examined the various dimensions of IEO and entrepreneurial readiness. For example, Ebrahim and Schott (2014) empirically found that risk-taking propensity is a predictor of entrepreneurial readiness. Through the lens of the Theory of Planned Behaviour (ToPB), Iqbal, Melhem and Kokash (2012) demonstrated that entrepreneurial perception influenced university students' readiness to take risks and to overcome business challenges. Braum and Nassif (2019) also discovered that individual entrepreneurial orientation significantly and positively influences entrepreneurial readiness. In addition, entrepreneurial personality was found to significantly influence entrepreneurial readiness by Saputri et al. (2019). Recently, Kumar et al. (2021) found that risk-taking, innovation and proactivity positively and significantly influence entrepreneurial intentions of entrepreneurship and management students in Indonesia. IEO dimensions (risk-taking, innovation, and proactivity) have also been found to significantly impact entrepreneurial intention among university students (Suartha and Suprapti, 2016; Dakhan et al., 2021). To this end, we therefore hypothesised that:

Ha1: IEO risk-taking has significant effect on students' entrepreneurial readiness for business creation.

Ha2: IEO innovative has significant influence on students' entrepreneurial readiness for business creation.

Ha3: IEO proactive has significant impact on students' entrepreneurial readiness for business creation.

Demographic and psychological characteristics have been identified to determine various attitudes and behaviours. Previous studies have indicated that a demographic factor such as gender is a measurable construct of IEO development (Goktan and Gupta, 2015; Suartha and Suprapti, 2016). Suartha and Suprapti (2016) examined the relationship between IEO and entrepreneurial intention of university students in Indonesia. The result shows that male students have a higher mean score of IEO than their female counterparts; however, there is no significant difference between male and female entrepreneurial intention. Goktan and Gupta (2015) explored sex, gender, and IEO of men and women from the United States, Turkey, Hong Kong, and India. The scholars found that in these countries men rather than women are strongly related to IEO. Another related study revealed that female entrepreneurs are more proactive than male entrepreneurs; while there is no gender difference in risk and innovativeness (Jelenc et al., 2016). Based on these findings we formulated that:

Ha4: IEO has significant gender differences in entrepreneurial readiness for business creation.

Previous study has shown that risk-taking, innovation, and proactivity have significant impact on the establishment and performance of small businesses (Rahaman, et al., 2021). However, Ibrahim and Lucky (2014) noted that the components of IEO such as risk-taking, innovation and proactivity are lacking among young people in Nigeria. In similar vein, Aminu (2016) asserted that lack of integration of IEO propensities such as risk-taking, innovation, and proactivity in entrepreneurship programmes is one of the challenges of entrepreneurship education in Nigeria, especially in TVET institutions. To this end, Koe (2016) suggested that future research is needed to examine entrepreneurial orientation at individual level through the design of an entrepreneurship curriculum. One of the motivations of this study is to determine the influence of IEO risk-taking, innovation and proactivity on students' entrepreneurial readiness for business creation in Nigeria.

CONCEPTUAL MODEL

Figure 1: IEO Dimensions

Figure 1 above shows the relationship between IEO in terms of risk-taking, innovation, proactivity, and entrepreneurial readiness. The model also indicates the gender impact in the relationship between IEO and

entrepreneurial readiness. The conceptual model was designed to determining the contributions of IEO dimensions to entrepreneurial readiness of young minds in Nigeria.

The Nigeria situation

In a developing context like Nigeria, the concept of IEO has been examined to prepare young individuals for future work. However, most of the studies have concentrated on both entrepreneurial orientation and entrepreneurial intention of company performance (Alarape, 2013; Ibrahim and Lucky, 2014; Ibrahim and Martins, 2020). Conversely, few studies have been conducted on the influence of IEO on students' entrepreneurial readiness (Aminu, 2016; Abubakar and Yakubu, 2019; Gabriel and Kobani, 2022). On one hand, Gabriel and Kobani (2022) evaluated individual entrepreneurial orientation and community development in Nigeria. The authors argued that IEO such as community development has the potential to stimulate development in the areas of healthcare, rural industry, education, and social network of the community. On the other hand, Aminu (2016), and Abubakar and Yakubu (2019) found that IEO is a moderating factor in entrepreneurship education and students' entrepreneurial intention towards venture creation in Nigeria. It is worthy of note that none of these studies empirically considers the dimensions of IEO on students' entrepreneurial readiness for business creation. Moreover, the determination of entrepreneurial readiness in relation with risk-taking, innovation, and proactivity among students of Technical Vocational Education and Training (TVET) colleges in Nigeria is underexplored. This has led to low business creation and increasing graduate unemployment in the country.

Entrepreneurship Education in TVET Colleges in Nigeria

In 2004, due to low business start-ups and increasing youth unemployment, the Nigerian government introduced entrepreneurship education into all TVET colleges. It is expected that TVET will supply young minds with technological skills in various trades, while entrepreneurship education will provide entrepreneurial skills for business start-ups (Fagge, 2017). Despite the concerted efforts of the Nigerian government to empower graduates of TVET colleges for employment creation and self-employment, the institutions are not performing well (Okolie, Elom, Osuji and Igwe, 2019). Previous scholars have argued that the entrepreneurship curriculum in TVET colleges lacks appropriate entrepreneurship programmes for business creation (Ladipo, Akhuemonkhan and Raimi, 2013; Maigida, Saba, and Namkere). The entrepreneurship curricular content in most TVET colleges in Nigeria is deficient in workshop programmes and practical engagements (see example in Table 1). The table below shows the entrepreneurship curriculum content of Lagos State Technical Vocational Education and Training.

Table 1: Scheme of Work for Entrepreneurship Studies

TECH 1	
TOPICS	APPLICATION
Mind building	Theory
Entrepreneurship concept	Theory
Business and small-scale business	Theory
Business opportunities	Theory
Classification of enterprise in business	Theory
Profit-making organisations	Theory
Partnership	Theory
Limited liability companies	Theory
Zero to something	Practical
Young Entrepreneur's Day	Exhibition
Cooperative societies	Theory
Identification of challenges involved in setting up a business	Theory
Entrepreneurship leadership role	Theory
Major competencies required for successful entrepreneurs	Theory
Decision-making process	Theory
Risk management	Theory
Setting up of a business	Theory
Business financing	Theory
Young Entrepreneur's Day	seminar
Key success factors in setting up a small business	Theory
Communication	Theory
Feasibility study	Theory
Business plan	Theory
Zero to something	Practical

TECH 2

Banking	Theory
Business documents	Theory
Financial record and types	Theory
Cash book	Theory
Petty cash book	Theory
Zero to something	Practical
Double column cash book	Theory
Trading, profit and loss account	Theory
Balance sheet	Theory
Business plan	Theory
Elements of contract	Theory
Zero to something	practical
TECH 3	
Organisational chart	Theory
Personnel management	Theory
Conflict resolution	Theory
Marketing	Theory
Modern trends in business	Theory
Zero to something	Practical
Store keeping	Theory
Business environment	Theory
Principles of costing	Theory
Mentorship programme	Theory
Safety rules and regulations	Theory
Innovations and inventions	Practical

Source: Lagos State Technical and Vocational Education Board (LASTVEB) (2017)

Table 1 above shows that more than 90% of the course content is taught theoretically. This is in line with the position of Ladipo *et al.* (2013) and Vincent *et al.* (2013) that the curriculum content of TVET institutions in Nigeria is deficient in practical translations. Thus, the students lack the key entrepreneurial skills such as risk-taking ability, innovation, and managerial competence to create and grow a business. Oviawe (2010) affirms that properly planned entrepreneurship programmes will ensure self-employment and increase job creation amongst the youth. The entrepreneurial characteristics of risk-taking, innovation, and proactivity which are part of the IEO concept have not been fully harnessed in entrepreneurship education (Ferreira *et al.* 2012). Koe (2016) emphasises that entrepreneurship education should lay emphasis on students' IEO ability in order to increase their entrepreneurial readiness.

METHODS

This study is grounded on the positivist philosophical assumption that the construction of knowledge is subject to the law of cause and effect in which scientific principles are applied (Wilson, 2014). The positivist view allows for the adoption of quantitative research design as demonstrated in much entrepreneurship literature (Sanchez, 2013; Adeniyi *et al.*, 2021). The case-study research technique informs the assessment of exit-level students from three TVET colleges in Lagos Metropolis of Nigeria. It is important to state that some of the students are already self-employed with small scale businesses as at the time of this survey. The independent variables (risk-taking, innovation, and proactivity) were measured from the instrument developed by Bolton and Lane (2012) and Vogelsang (2015), while the dependent variable (entrepreneurial readiness) was determined by an entrepreneurial readiness scale developed by Coduras, Saiz-Alvarez and Ruiz (2016). All the variables had internal consistency that surpassed the required threshold of 0.7 as shown in Table 2 below. A six-point Likert scale rating strongly disagree, disagree, slightly disagree, slightly agree, and strongly agree was adopted in measuring the students' entrepreneurial readiness.

Taro's equation model was helpful in the selection of 301 exit-level students from the 1212 sample frame. Questionnaires were administered to elicit required information from the students. Of the 301 distributed questionnaires, 289 were duly filled in and returned, which suggests a 98% response rate. The statistical tool, SPSS version 25, was utilised in the analysis of the data. Descriptive and inferential statistics such as correlation and regression were adopted in the presentation of results and test of hypotheses.

ANALYSIS

The variables were subjected to both validity and reliability tests to determine their internal consistency and sample adequacy. Table 2 below shows the coefficient values for a factor analysis.

Table 2: Factor Analysis

Variables	Mean	Std. Dev	Cronbach α	KMO	Bartlett's test
1 Risk-taking ability	4.79	0.755	0.76	0.793	$p < 0.05$
2 Innovation	4.99	0.782	0.76	0.817	$p < 0.05$
3 Proactivity	5.16	0.790	0.78	0.756	$p < 0.05$
4 Entrepreneurial readiness	4.88	0.803	0.90	0.922	$p < 0.05$

As shown in Table 2, all the variables indicated a reliability value between 0.76 and 0.90, which surpasses the minimum requirement of 0.7 (Wilson, 2014). The Keiser-Meyer Olkin, and the Bartlett's test values revealed that the sample is adequate for both data collection, and significance, respectively.

An anti-image correlation was performed to further measure the sampling adequacy of the data, as shown below.

Table 3: Anti-Image Correlation

Anti-Image Matrix				
Risk-taking ability	952 ^a			
Innovativeness	-0.133	940 ^a		
Proactivity	-0.199	-0.332	942 ^a	
Entrepreneurial readiness	-0.008	0.183	0.078	955 ^a

As shown in Table 3 above, the anti-image correlation number denoted as (^a) has 4 variables that meet the required measure of sampling adequacy, with coefficients greater than the minimum threshold of 0.5. This implies that all the constructs are valid for further analysis.

Table 4: Pearson's Correlation Coefficient

Variables	1	2	3	4
Risk-taking	1			
Innovativeness	0.475**	1		
Proactivity	0.520**	0.703**	1	
Entrepreneurial readiness	0.334**	0.415**	0.456**	1

Correlation is significant at 0.001 level (2-tailed)

The presentation in Table 4 depicts the result of the relationship between IEO and entrepreneurial readiness. The correlation effect reveals that all components (risk, innovation, and proactivity) of IEO have significant and positive association with entrepreneurial readiness – IEO risk-taking ($r = 0.334$, $n = 288$, $p < 0.001$), IEO innovation ($r = 0.415$, $n = 288$, $p < 0.001$) and IEO proactivity ($r = 0.456$, $n = 288$, $p < 0.001$). This indicates that IEO is a determining factor for entrepreneurial readiness. IEO proactivity shows the strongest correlation with entrepreneurial readiness

Test of Hypotheses

To test the hypotheses, we conducted a multi-collinearity test to verify the presence or absence of collinearity between the variables.

Table 5: Multi-collinearity Test

Variables	B	Std. Error	T	Sig.	Tolerance	VIF
Constant	0.778	0.242	3.216	0.001		
Risk-taking	0.006	0.048	0.131	0.896	0.674	1.484
Innovation	-0.182	0.059	-3.090	0.002	0.415	2.410
Proactivity	-0.080	0.061	-1.308	0.192	0.377	2.653

Table 5 above shows that the variance inflation (VIF) of the independent variables was well below 10; and the tolerance values were higher than 0.10 (tolerance > 0.10). Therefore, the variables are free from multi-collinearity, and the results of the regression analysis can be relied upon.

Table 6: IEO Propensities as Determinants of Entrepreneurial Readiness

Variables	Beta	B	T	Sig.	R ²	F	Df.	Sig.
Constant		1.989	6.190	< 0.05				
Risk-taking	0.109	0.116	1.769	0.079	0.234	28.985	3;284	< 0.05
Innovation	0.153	0.168	2.200	< 0.05				
Proactivity	0.286	0.291	3.745	< 0.05				

Predictor: Risk-taking, innovation, proactivity

Dependent variable: Entrepreneurial readiness

Table 6 above shows the outcome of the regression analysis, with R² value as 0.234, which implies that IEO was able to explain 23.4% variations in entrepreneurial readiness. Further, while innovation $\beta = 0.153$, $t(287) = 2.200$, $p < 0.05$, and proactivity $\beta = 0.286$, $t(287) = 3.745$, $p < 0.05$ show a significant association with entrepreneurial readiness, the standardized beta value of risk-taking $\beta = 0.109$, $t(287) = 1.769$, $p > 0.05$ shows an insignificant association with entrepreneurial readiness. Therefore H_1 (*IEO risk-taking ability has a significant effect on students' entrepreneurial readiness for business creation*) was rejected. However, the significant association between innovation, proactivity, and the students' entrepreneurial readiness implies that H_2 (*IEO innovation has a significant influence on students' entrepreneurial readiness for business creation*) and H_3 (*IEO proactive steps have a significant impact on students' entrepreneurial readiness for business creation*) were accepted.

Table V7: Gender Difference in IEO Propensities and Students' Entrepreneurial Readiness

Variables	Beta	B	T	Sig.	R ²	F	Df.	Sig.
Male								
Constant		2.012	4.000	< 0.05				
Risk-taking	0.135	0.141	1.660	0.099	0.177	11.010	3;154	< 0.05
Innovation	0.169	0.183	1.916	0.057				
Proactivity	0.221	0.246	2.365	< 0.05				
Female								
Constant		1.998	4.590	< 0.05				
Risk-taking	0.084	0.091	0.860	0.391	0.286	16.829	3;126	< 0.05
Innovation	0.143	0.141	1.075	0.284				
Proactivity	0.356	0.339	2.776	< 0.05				

Predictor: Risk-taking, innovation, proactivity

Dependent variable: Entrepreneurial readiness

The presentation in Table 7 shows the gender difference in the students' entrepreneurial readiness as influenced by IEO for business creation. On one hand, the result shows that risk-taking $\beta = 0.135$, $t(154) = 1.660$, $p > 0.05$; $\beta = 0.084$, $t(126) = 0.860$, $p > 0.05$, and innovation $\beta = 0.183$, $t(154) = 1.916$, $p > 0.05$; $\beta = 0.143$, $t(126) = 1.075$, $p > 0.05$ have no significant association with the male and female students' entrepreneurial readiness, respectively. On the other hand, proactivity shows significant association with male and female students' entrepreneurial readiness $\beta = 0.221$, $t(154) = 2.365$, $p < 0.05$; $\beta = 0.356$, $t(126) = 2.776$, $p < 0.05$, respectively. This indicates that there is no significant gender difference between the students' entrepreneurial readiness as influenced by IEO towards business creation. This further suggests that H_4 (*IEO propensities have significant gender difference in entrepreneurial readiness for business creation*) be rejected. It should be noted that, on aggregate, IEO shows significant association with both male and female students' entrepreneurial readiness $F(3;154) = p < 0.05$; $F(3;126) = p < 0.05$, respectively.

DISCUSSION OF FINDINGS

The aim of this study is to comprehend students' entrepreneurial readiness patterns as influenced by IEO positions on business creation. In this study, three constructs of IEO – risk-taking, innovation, proactivity, and a control variable (gender), were evaluated for observed significance.

Research findings from the regression model indicate that IEO risk-taking ability has no significant impact on students' entrepreneurial readiness $\beta = 0.109$, $t(287) = 1.769$, $p > 0.05$. Therefore, the first hypothesis was rejected. This is in line with the position of Olajide (2015) that risk-taking deficiency is one of the challenges facing students in Nigeria on venturing into business. This is further buttressed by Ibrahim and Lucky (2014) that the IEO component of risk-taking is lacking among students in Nigeria. Despite the teaching on risk management as shown in the TVET entrepreneurship curriculum, findings from the study revealed that the students from these colleges show low risk-taking ability towards starting a business. The challenge may be attributed to a lack of practical training programmes on risk management in the entrepreneurship curriculum of the selected TVET colleges (see

Table 1). Wenberg, Pathak, and Autio (2013) had earlier stated that aversion to risk hinders entrepreneurship endeavours.

Several empirical investigations have shown that risk-taking ability is associated with successful entrepreneurs (Ebrahim and Schott, 2014; Kumar *et al.*, 20221). We argue that the lack of risk-taking ability, as demonstrated in this study, is not unconnected to the poor level of business creation among the youth. The ability to gather economic resources such as capital, investors, assets, employees, and suppliers for business implementation are a function of risk endeavour. Moreover, strong ability to take business risk is required to survive the Nigeria entrepreneurial ecosystem.

Results from the regression analysis also reveal that IEO innovativeness and IEO proactivity show significant association with the students' entrepreneurial readiness $\beta = 0.153$, $t(287) = 2.200$, $p < 0.05$; $\beta = 0.286$, $t(287) = 3.745$, $p < 0.05$, respectively. As a result, Hypotheses 2 and 3 were accepted. This result is consistent with the assertion of Wiklund and Shepherd (2005) that proactivity and innovation have a significant effect on the performance of an entrepreneur's business. Bolton and Lane (2012) added that innovation and proactivity are essential to the business-decision process. Innovation and proactivity have also been found to influence entrepreneurship training for start-ups among students from Norway and the United States (Robinson and Stubberud, 2014). This implies that innovative skills and proactive steps are critical for business start-ups. However, graduates of TVET colleges in Nigeria are yet to transform these skills into business enterprises. This is because of the low business spin-offs and increasing youth unemployment rate in the country.

Using gender as a control variable, the outcome of the regression analysis reveals that risk-taking $\beta = 0.135$, $t(154) = 1.660$, $p > 0.05$; $\beta = 0.084$, $t(126) = 0.860$, $p > 0.05$, and innovation $\beta = 0.183$, $t(154) = 1.916$, $p > 0.05$; $\beta = 0.143$, $t(126) = 1.075$, $p > 0.05$ have no significant association with male and female students' entrepreneurial readiness, respectively. However, proactivity shows significant association with male and female students' entrepreneurial readiness $\beta = 0.221$, $t(154) = 2.365$, $p < 0.05$; $\beta = 0.356$, $t(126) = 2.776$, $p < 0.05$, respectively. This suggests that there is no significant difference in both male and female students' entrepreneurial readiness as determined by IEO. This result affirms the empirical findings of Suartha and Suprapti (2016). The authors reported that there is no significant difference between male and female students' entrepreneurial intention as influenced by IEO. This study also demonstrated that the female students show higher proactive ability ($B = 0.339$) than their male ($B = 0.246$) counterparts. This finding aligns with the study conducted by Jelenc *et al.* (2016), in which female entrepreneurs were more proactive than male entrepreneurs; while there is no gender difference in risk-taking ability (Jelenc *et al.*, 2016). This finding is in contrast to the report of Suartha and Suprapti (2016), in which male students have a higher score of IEO than their female counterparts. Additionally, Goktan and Gupta's (2015) study on IEO of men and women from the United States, Turkey, Hong Kong, and India revealed that men are strongly related to IEO than women. The gender indifference of IEO in male and female entrepreneurial readiness suggest the achievement of gender parity in entrepreneurship as a result of education (Adeniyi and Ganiyu, 2020). In recent times, the Nigerian informal sector has witnessed increase in female-owned businesses (Ogundana *et al.*, 2021), which is driven by necessity entrepreneurship.

The insignificant association between risk-taking and innovation, and male and female entrepreneurial readiness may be attributed to poor infrastructural facilities and the continuous unavailability of foreign exchange for businesses in the country. For instance, the epileptic power supply in many parts of the country discourages innovations and ideas to start a business. Foreign exchange unavailability for business is the most recent cause of exit of many multinational companies from Nigeria. Companies such as Michelin Tyres, Deli Foods, Procter & Gamble, Mr Price Group, ExxonMobil, GlaxoSmithkline to name a few, have all shut down operations due to the cost of doing business in the country. The Nigeria Naira has continued to fall against the Dollar in recent times. The rate of Dollar jumped from 742.268 in August 2023 to 832.578 in October 2023 (Central Bank of Nigeria, 2023) making it the worst in the history of foreign exchange. This hostile entrepreneurial ecosystem prevents young people from taking business risks.

CONTRIBUTIONS AND MANAGERIAL IMPLICATIONS

A major contribution to scholarship in entrepreneurship is the identification of the insignificant impact of risk-taking ability to entrepreneurial readiness in Nigeria. The study also revealed that IEO shows no gender difference between male and female entrepreneurial readiness. This is one of the first studies to measure students' entrepreneurial orientation for entrepreneurial readiness within the context of TVET colleges in Nigeria. The study demonstrated that the current entrepreneurship education curriculum at the selected TVET college requires a reform in the development of individual student's entrepreneurial orientation towards business creation. This suggests the need for Lagos State Vocational Education Board (LASTVEB), and other stakeholders in curriculum reform for TVET colleges and general education to gain insight into reforming the entrepreneurship curriculum content to suit students' needs. The lack of practical translation of entrepreneurship trainings is also evident in this study. Since entrepreneurship education is practice oriented, there is a crucial need to incorporate extensive hands-on-learning entrepreneurship programmes via workshops, seminars, computer-based simulations, and field

activities with TVET skills. There is urgent need for the government to improve infrastructural facilities and the economic situation to encourage foreign investors and young minds to take advantage of entrepreneurship opportunities.

CONCLUSION

Entrepreneurship education is globally recognised for its role in human capital development. However, the entrepreneurial ecosystem in Nigeria does not encourage young individuals to harness the opportunities in entrepreneurship. It was observed that the lack of business risk-taking ability may be traceable to the faulty entrepreneurship curriculum, in which risk-taking management is taught as a classroom subject, rather as part of entrepreneurship training programmes or workshops on how to take business risks. Hence, risk-taking ability failed to contribute to the students' entrepreneurial readiness to start a business. These challenges influence the low business creations among the youth in Nigeria. The practical integration of IEO components with an entrepreneurship scheme of work at TVET colleges will foster business start-up development for self-employment and employment creation. The combination of specific entrepreneurship skills and TVET skills will help to reduce youth unemployment and poverty in a developing context like Nigeria.

Limitations and future study

Some other fundamental constructs of IEO such as autonomy and competitive aggressiveness were not considered in this study. While competitive aggressiveness is closely related to a firm's strategic characteristic, we suggest that future research may consider the assessment of individuals' autonomy towards engaging in entrepreneurial activities among nascent entrepreneurs. The inclusion of the ecosystem components may further provide insights to the cause and effects of low business start-ups among young individuals in Nigeria.

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Competing interests

All the authors wish to state that there is no competing interest among the authors in relation to this research study.

Availability of data and materials

The primary data of this survey research is available on Humanities and Social Sciences Communications Dataverse repository online link (XXY).

Ethical consideration

This research has been ethically reviewed and approved by the XYZ Committee, with approval number XXXXX.

Informed consent

Informed consent was obtained from all the participants in this study, and confidentiality of the participants were treated according to POPIA guidelines.

Authors contributions

All the authors contributed equally to this work.

NAVIGATING TRANSITION: A FEMINIST EXPLORATION OF WOMEN'S ENTREPRENEURSHIP IN POST-SOCIALIST CONTEXTS

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Abstract:

In post-socialist contexts, women's entrepreneurship is shaped by shifting institutional landscapes and persistent gender norms. This article uses a feminist, post-structuralist lens to examine a female entrepreneur's experiences in Slovenia, revealing critical factors such as personal motivation, contextual embeddedness, and resilience amid economic transition. Through a qualitative case study, it highlights how structural challenges intersect with individual agency, ultimately influencing professional development and business success. The findings underscore the need for intersectional research and inclusive policies that bolster women's entrepreneurial endeavors, offering insights into broader dynamics affecting female entrepreneurship in transitional economies. Critical implications follow.

Keywords: Women's entrepreneurship, Post-socialist contexts, Feminist perspective, Qualitative case study, Contextual embeddedness

INTRODUCTION

The evolution of female entrepreneurship has garnered significant scholarly attention, yet prevailing research often defaults to masculine norms and frameworks. In many societies, women entrepreneurs still encounter persistent structural barriers, limited access to resources, and underlying societal biases regarding their capabilities. Post-socialist contexts like Slovenia, Croatia, Poland, and Romania present an especially revealing backdrop for studying these dynamics, given their relatively recent economic transformations and the ongoing recalibration of social institutions. Investigating women's entrepreneurial experiences within these fluid settings illuminates not only the region's transition from socialist to market-based economies but also the rich, complex interplay between personal agency and shifting cultural norms.

This study adopts a qualitative, feminist, and post-structuralist lens to examine how women navigate and shape their entrepreneurial journeys despite systemic constraints. By focusing on a female entrepreneur's lived experiences, the research spotlights factors such as professional motivation, contextual embeddedness, and the significance of resilience under uncertain conditions. Ultimately, this approach seeks to deepen our understanding of how gender, institutional change, and personal innovation converge, providing a nuanced perspective on women's entrepreneurship in evolving socio-economic landscapes.

THEORY

Entrepreneurship has historically been portrayed in most of the prevailing literature as a distinctly masculine construct, reflecting both the socio-cultural assumptions and the theoretical frames that guide scholarship in this field (Galloway et al., 2015). This view tends to focus on a narrow interpretation of masculinity—one that underscores traits like assertiveness, competitiveness, and risk-taking, often overlooking the rich variation of entrepreneurial behavior across genders. By centering on an "ideal-type" entrepreneur that aligns with hegemonic masculinity, many studies have inadvertently marginalized the experiences, contributions, and needs of women entrepreneurs, who often operate in contexts where their entrepreneurial activities are shaped by both cultural and institutional constraints.

Over the past decade, scholars have increasingly acknowledged the importance of broadening the entrepreneurship discourse to encompass diverse gender identities and experiences. In order to shift beyond the traditionally masculine paradigm, more empirical work should deliberately incorporate feminist, post-structuralist approaches, as well as gender-integrative conceptualizations (Clark Muntean & Özkazanç-Pan, 2015). Such approaches advocate for the systematic use of inclusive language, imagery, and representations that decenter hegemonic male norms. They further highlight the need to frame entrepreneurship not solely as an economic undertaking driven by competition and profit, but also as a complex, socially embedded activity that can be enacted by various individuals across different socio-cultural landscapes. This recalibration of theory and practice would not only enrich our understanding of entrepreneurial processes but also promote more equitable outcomes for women entrepreneurs. Supporting this perspective, Klanšek (2020) argues in a review essay that gender should be employed not merely as a categorical variable but rather as a theoretical lens—one that illuminates the relational, contextual, and socially constructed aspects of entrepreneurship. Similar logic applies to feminist theorizing in the subfield of female

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entrepreneurship. Although female entrepreneurship has rapidly grown as a topic of scholarly investigation, it frequently recapitulates research questions and methods inherited from general entrepreneurship studies, thus replicating the same masculine underpinnings. Nevertheless, the area has evolved significantly over the past few decades, offering critical insights into how women navigate entrepreneurial ecosystems that may be less than conducive to their success. An important next step in advancing this field is to highlight the multiplicity of contexts—cultural, institutional, historical, and economic—in which women entrepreneurs operate.

To deepen our understanding of these multifaceted contexts, it is instructive to conduct case study analyses of women's entrepreneurship in post-socialist countries. By exploring female entrepreneurial behavior in such regions, researchers can more precisely account for the phenomenon of contextual embeddedness (Granovetter, 1985)—the principle that economic action is deeply enmeshed within social and institutional networks. These contexts shape not only the resources available to women, but also the cultural norms and values that influence their entrepreneurial ambitions, strategies, and outcomes. As a concrete example, Slovenia or similarly positioned post-socialist countries (for instance, Croatia, Poland, or Romania) present compelling empirical settings. Having undergone institutional and economic transformations over the last three decades, these societies offer a unique window into how shifts in governance structures, market regulations, and socio-cultural paradigms can redefine gender norms and alter the entrepreneurial landscape.

Focusing on Slovenia is especially relevant given its historical trajectory. As part of the former Yugoslavia, Slovenia embraced a form of market socialism that differed substantially from the centrally planned socialist systems found in other Central and Eastern European nations (Szerb & Turnbull, 2016). Following the collapse of the communist regime, Slovenia's transitional period combined elements of its previous market-socialist structure with rapid institutional reforms designed to align the country with broader European Union standards. These reforms, while fostering new opportunities for business creation, also introduced complex challenges for women seeking to start and grow ventures. Understanding how female entrepreneurs respond to such evolving institutional contexts has the potential to yield novel insights into the interplay of gender, policy, and market conditions. Case-based analyses that foreground these unique historical and socio-economic transformations could sharpen our collective understanding of the mechanisms shaping women's entrepreneurial activities under changing institutional regimes.

From a methodological standpoint, emerging research paradigms such as feminist standpoint theories (FST) and post-structural feminism (PSF) demand more nuanced and innovative study designs. Scholars increasingly recognize the necessity of integrating large-scale quantitative data with qualitative insights, thereby allowing us to move beyond simple male–female comparative analyses toward more context-specific examinations. For example, future investigations could delve into how sectoral differences, regional identities, or distinctive country-level policies interact with women's entrepreneurial practices, illuminating the social and cultural particularities that often remain concealed in aggregated surveys. In addition, rigorous approaches to sampling, data collection, and analysis are crucial for generating robust findings. Access to gender-disaggregated datasets, along with transparent documentation of data sources and analytic procedures, enables greater scrutiny of research outcomes and helps address the challenges of working with smaller samples. Triangulating multiple sources—qualitative interviews, archival records, and statistical indicators—can further bolster the reliability and relevance of research findings.

Crucially, this methodological shift must also be anchored in an epistemological transformation, whereby scholars explicitly investigate how gender itself is constructed, performed, and reproduced within entrepreneurship (Henry et al., 2016). Rather than treating gender as a fixed trait or simple demographic characteristic, researchers should explore how power relations, identity negotiations, and cultural scripts intersect in the business creation process. Such an approach recognizes the fluid and dynamic nature of gender and its ongoing reproduction in both formal and informal entrepreneurial settings. Ultimately, adopting these interdisciplinary and reflexive perspectives will foster scholarship that not only reflects the diversity of women's entrepreneurial experiences but also meaningfully contributes to more equitable, inclusive environments for all entrepreneurs.

The primary research question guiding this study is: How do women entrepreneurs in post-socialist contexts navigate structural constraints, cultural norms, and their own personal motivations to establish and grow successful ventures? Specifically, the research probes how individual attributes (e.g., resilience, professional expertise), contextual factors (e.g., institutional transitions, sociocultural expectations), and gendered power dynamics intersect in shaping entrepreneurial paths. By focusing on a single female entrepreneur's experiences, the study seeks to illuminate the nuanced ways in which women negotiate both formal and informal barriers, ultimately offering insight into broader dynamics influencing female entrepreneurship in transitional economies.

METHOD

This qualitative study explores the lived experiences of a female entrepreneur in a specific social, cultural, and institutional setting, drawing on feminist and post-structuralist perspectives that highlight how individual agency intersects with broader gender norms and power dynamics. A case study approach was chosen for its capacity to generate deep, contextual insights into a single participant's motivations, challenges, and achievements.

Participant Selection employed purposive sampling, choosing an individual who had transitioned from public-sector employment to running her own business in a post-socialist environment. Her professional background in accounting and tax consulting offered concrete illustrations of how structural changes and cultural expectations shape women's entrepreneurial trajectories.

Data Collection involved a semi-structured interview guided by open-ended questions. Topics ranged from personal background and motivations to the technical skills and competencies crucial for business growth. The interview protocol was informed by both feminist theory and existing research on women's entrepreneurship, ensuring a focused yet flexible discussion of her experiences.

FINDINGS

Below is a summary of the main insights gleaned from an interview with a female entrepreneur who has been successfully running her own business for several years. Her reflections shed light on the challenges, opportunities, and contextual factors influencing women's entrepreneurship. In interpreting these findings, we draw on feminist and post-structuralist perspectives, which highlight the importance of both individual experiences and the broader societal and institutional environment that shapes women's roles in business.

1. Personal Experiences and Characteristics

The participant noted that from a young age, she was creative and inclined to pursue alternative, more innovative paths. Her desire to start her own business gradually emerged in response to her experiences working in the public sector, where she perceived inefficient and overly bureaucratic processes. These early entrepreneurial ambitions solidified while she was employed at the Chamber of Craft of Slovenia, which she saw as an opportunity to deepen her expertise in tax advisory services—knowledge that would eventually help her establish her own venture. This trajectory supports the theoretical view that women often enter entrepreneurship when they perceive a need for change and a desire for professional autonomy.

2. Motivations and Goals

The primary motivator for establishing her business was a sense of professional limitation and lack of personal development in her previous role. Several years before formally launching her business, she began drafting a business plan for an accounting and tax consulting service, which she ultimately brought to life in 1995. This process underscores her persistence and goal-oriented mindset: despite structural constraints at her workplace, she remained committed to the vision of owning a business. From a feminist perspective, this decision can be understood as an effort to break free from traditional roles and gain greater control over her professional life.

3. Critical Personal Traits

The participant highlighted persistence and the courage to challenge conventional norms as pivotal to her success. She noted a lack of initial support from family and friends, and her decision to leave a well-paid, secure public-sector position was made even more complex by the onset of a chronic illness and her responsibilities as a sole caregiver for her child. Nevertheless, she chose to embark on an uncertain entrepreneurial journey without any capital, firmly believing in a positive outcome—and indeed, it worked out well. Using post-structuralist frameworks, this experience illustrates how personal circumstances (e.g., health, family obligations) intersect with social structures that can disadvantage women, while also prompting them to develop unique strategies for navigating these challenges.

4. Skills and Competencies

The entrepreneur emphasized her inherited talent for accounting and tax systems, which she further developed through her tax advisory work. She described herself as highly inquisitive and eager to learn—qualities that fueled her passion for studying, conducting research, tackling complex professional challenges, writing articles, and delivering lectures. She derives the greatest satisfaction from finding effective solutions for her clients and seeing their positive response to her work. From the standpoint of contextual embeddedness, her success is not solely based on technical expertise but also on her capacity to operate within broader social and professional networks and to provide client-focused, high-quality services.

Observations

The interview indicates that the entrepreneur's decision to start her own business was motivated by dissatisfaction with her previous work environment and by her desire for creativity and autonomy. Her experience underscores the importance of personal attributes like perseverance, adaptability, enthusiasm for one's field, and a willingness to take risks. Moreover, her technical and professional expertise in problem-solving proved invaluable in establishing a successful consulting and accounting business. Despite systemic factors (such as limited support and conventional social expectations) and personal hurdles (health issues and childcare responsibilities), she successfully created and sustained her enterprise.

Viewed through feminist and post-structuralist lenses, four key themes emerge:

1. The interplay of individual and societal factors that either constrain or encourage women's entrepreneurship.

2. The significance of contextual embeddedness, as institutions, laws, and social norms shape entrepreneurial choices.
3. Entrepreneurial activity as a response to perceived limitations and a means of achieving greater professional self-determination.
4. The value of innovative competencies and skills that enable women entrepreneurs to meet market needs, build client trust, and thrive in competitive environments.

LIMITATIONS

Single-Participant Focus: The rich, in-depth information derived from one participant offers a detailed case study but limits the generalizability of the findings. Future research might expand to multiple participants or comparative studies across different regions.

Context-Specific Setting: The post-socialist environment provides a unique backdrop that may not directly translate to other cultural or economic contexts. Nevertheless, the insights gleaned can inform a broader discourse on women's entrepreneurship in transitional economies.

Future Research Possibilities

Building on the insights gained from this qualitative case study, several avenues for future research present themselves. A first line of inquiry involves comparative multi-case studies, which could examine multiple women entrepreneurs across various post-socialist countries—such as Croatia, Poland, and Romania—to investigate how distinct transitions and institutional changes shape female entrepreneurship. In addition, cross-cultural investigations that compare the experiences of women entrepreneurs in post-socialist contexts with those in Western or developing economies could shed light on the influence of cultural norms and institutional frameworks on their motivations, constraints, and ultimate success.

A second promising direction focuses on sector-specific analyses. Researchers could conduct industry comparisons by studying women's entrepreneurial ventures in technology, healthcare, creative industries, and other fields to determine whether particular sectors offer more supportive ecosystems or present unique gender-based challenges. Additionally, investigations into emerging industries, such as digital platforms and sustainability-focused enterprises, could reveal whether these newer fields foster more egalitarian practices and opportunities for women entrepreneurs.

CONCLUSION

In summary, the study employed a qualitative case study design rooted in feminist standpoint and post-structuralist frameworks. Data collection involved a semi-structured interview, and the analysis utilized a thematic approach to code and interpret the participant's experiences. By foregrounding the participant's voice and situating her narrative within the socio-institutional context of a post-socialist country, the study provides in-depth insights into how gender, context, and personal agency converge in shaping entrepreneurial journeys.

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FISCAL CONSOLIDATION IN SLOVAKIA: AN OVERVIEW OF ADOPTED MEASURES AND ITS IMPACT ON THE BUSINESS ENVIRONMENT

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Abstract:

In response to the growing public finance deficit, Slovakia implemented a series of measures in 2025 to reduce the deficit and stabilize public debt. Key fiscal actions include increasing the standard value-added tax (VAT) rate, introducing a financial transaction tax for businesses, and raising the corporate income tax rate. In addition to tax adjustments, the government adopted measures to reduce public expenditures and optimize state investments to achieve fiscal consolidation in line with European regulations. This study provides a systematic overview of the adopted measures and their legislative and macroeconomic context. It analyses their objectives and projected impact on public finances and the business environment. The findings suggest that these measures represent the first phase of a longer-term fiscal strategy, with their success dependent on further reforms and macroeconomic developments.

Keywords: fiscal consolidation, debt, taxes

INTRODUCTION

In recent years, Slovakia has encountered growing challenges in managing its public finances, driven by both internal inefficiencies and external economic pressures. The years following the COVID-19 pandemic, coupled with the impact of inflation, demographic shifts, and structural rigidities in the labor market, placed a substantial burden on the state budget. At the same time, the European Union's fiscal framework has increasingly emphasized the need for member states to maintain fiscal discipline and ensure debt sustainability. Within this context, the Slovak government found itself in a situation where decisive and comprehensive action was necessary to prevent a further deterioration of its fiscal position.

By mid-2024, projections indicated that without targeted consolidation measures, Slovakia's public deficit would persist above 5% of GDP annually, while public debt could rise to unsustainable levels, threatening macroeconomic stability and investor confidence. Moreover, the structure of public expenditures showed limited flexibility, with significant portions committed to mandatory spending such as pensions, healthcare, and interest payments on debt. These constraints made it evident that fiscal consolidation would require a balanced mix of revenue-increasing and expenditure-saving measures.

Recognizing the urgency of the situation, the Slovak government introduced a far-reaching fiscal consolidation package to be implemented beginning in 2025. The declared objective was not only to reduce the public finance deficit below the 3% threshold mandated by the Stability and Growth Pact, but also to create the conditions for a more resilient and sustainable fiscal framework. The consolidation plan encompasses a broad range of tax reforms, revisions to expenditure policies, and systemic adjustments aimed at modernizing fiscal governance in Slovakia. This article aims to analyze the nature, rationale, and projected implications of the 2025 fiscal consolidation package. Special attention is paid to the measures affecting the business sector, including changes in corporate taxation, the introduction of a financial transaction tax, and modifications in indirect taxation. The study further considers the anticipated macroeconomic effects of these reforms, potential risks, and the reactions from domestic and international stakeholders. Given that fiscal policy is not only a technical instrument but also a socio-political process, this paper emphasizes the importance of transparency, dialogue, and institutional trust in achieving successful consolidation.

In the following sections, we provide a detailed review of the economic and institutional background leading to the consolidation, a structured presentation of the adopted measures, and a critical discussion of their expected impact on public finances and the private sector. Through this examination, the article contributes to the broader debate on fiscal governance in small open economies and offers insights relevant to policymakers, researchers, and practitioners alike.

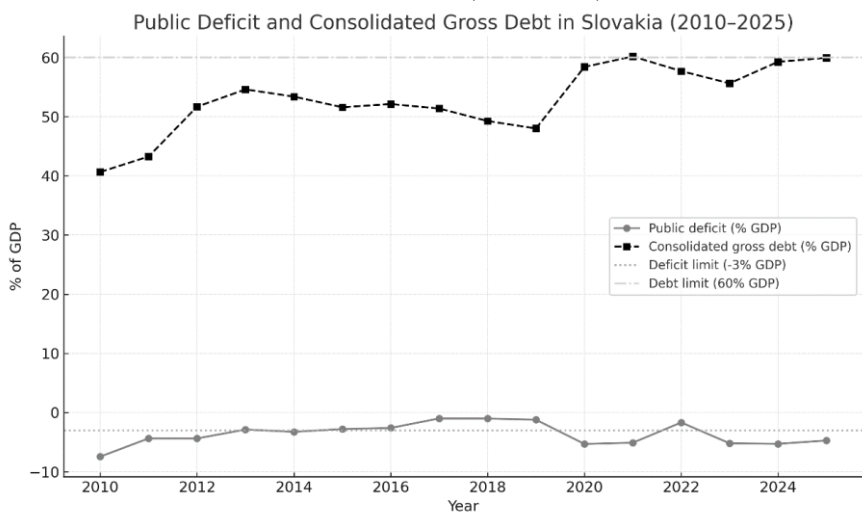
FISCAL CONSOLIDATION IN 2025

Slovakia is currently facing a high-risk situation in its public finances, a condition underscored by persistent structural deficits, a growing public debt burden, and limited fiscal space for discretionary spending. Several factors have contributed to this unfavorable trajectory. Among them are post-pandemic recovery costs, inflationary pressures exacerbated by energy price volatility, demographic aging, and long-standing inefficiencies in public

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expenditure. These challenges have not only increased the financial obligations of the state but have also weakened its capacity to invest in growth-enhancing areas such as education, infrastructure, and innovation. In addition, the geopolitical instability resulting from the war in Ukraine and its economic repercussions—particularly the rise in energy costs and supply chain disruptions—have put further strain on the fiscal positions of many European countries, including Slovakia. The state has had to accommodate extraordinary spending measures to mitigate the social and economic impacts of these crises, resulting in a deteriorating fiscal balance.

Figure 1
Development of Public Deficit and Gross Debt in Slovakia (2010–2025)



Source: authors’ representation based on Statistical Office of the SR data (2025)

The Figure 1 illustrates the evolution of Slovakia's public deficit and consolidated gross debt as a percentage of GDP between 2010 and 2025. It includes reference lines indicating the Maastricht criteria: a 3% GDP ceiling for the deficit and a 60% GDP ceiling for the debt.

According to projections from the Slovak Ministry of Finance and international institutions such as the International Monetary Fund (IMF) and the European Commission, the public finance deficit in Slovakia was on track to remain between 5% and 6% of GDP in the absence of corrective policies. This persistent imbalance would have likely pushed the public debt ratio to 70% of GDP or higher by the end of 2028, breaching Maastricht criteria and undermining investor confidence in Slovakia’s fiscal trajectory. In this context, consolidation is viewed not merely as a domestic economic imperative but as a political and legal necessity arising from Slovakia’s membership in the European Union and the euro area, where adherence to the rules of the Stability and Growth Pact is required.

Moreover, Slovakia's fiscal vulnerabilities have been compounded by the rigidity of its budget structure. Mandatory expenditures—comprising pensions, health care, and debt servicing—constitute a substantial portion of the budget, leaving little room for maneuver in times of crisis. This limited flexibility underscores the need for long-term reforms that address the composition and efficiency of public expenditures. Without structural changes, even temporary revenue increases may prove insufficient to restore fiscal sustainability.

Therefore, the rationale for fiscal consolidation in Slovakia lies in a combination of short-term needs and long-term strategic considerations. On the one hand, immediate action is required to cut deficits and restore fiscal order; on the other hand, the country must embark on a path of structural reforms that will ensure the long-term viability of its public finances and resilience to future shocks. The consolidation plan adopted in 2024 aims to strike this balance by combining targeted tax increases with systemic efforts to enhance public sector efficiency and support economic stability. The following sections provide an in-depth examination of the specific measures introduced as part of this plan and assess their expected implications.

In early October 2024, the government of the Slovak Republic adopted a comprehensive fiscal consolidation plan that aims to reduce the public finance deficit below 3% of GDP by 2027. The consolidation package, which will be implemented gradually starting from January 1, 2025, is projected to generate additional public revenue of approximately 2.7 billion euros. However, concerns have been raised by various stakeholders, particularly representatives of the business sector and civil society organizations, regarding the potential negative impacts of these measures on economic competitiveness, living standards, and the predictability of the business environment. The primary objectives of the consolidation are threefold: to reduce the structural deficit, to ensure the sustainability of public finances, and to restore investor confidence in Slovakia's economic governance. The government has stated that these reforms are designed not only to correct current fiscal imbalances but also to lay the foundation for more resilient and long-term economic growth.

Chart 1

Key fiscal consolidation measures in Slovakia (2025)

CATEGORY	MEASURE	DESCRIPTION	ESTIMATED BUDGET IMPACT (€ MIL)
VAT Reform	Standard VAT rate increased	From 20% to 23%	+756
	Two reduced VAT rates introduced	19% (food, electricity), 5% (books, medicines, etc.)	
Corporate Income Tax	Progressive CIT rate	24% for taxable income > €5M	+489
	CIT relief for SMEs	10% for income < €100K 15% rate retained for mid-sized firms	-45
Financial Transaction Tax	New tax on business payments and withdrawals	0.4% on debits from business accounts (max €40 per transaction); 0.8% on cash withdrawals (no cap); flat fee of €2/year for company payment cards	+723
Sector-Specific Levies	Oil refineries, telecoms, pharma	Special levies on regulated sectors with high profits	+61
Sugar Tax	Excise tax on sweetened beverages and concentrates	€0.15–1.05/litre depending on product type	+30–60 (est.)
Dividend Tax	Withholding tax reduction	From 10% to 7% to support entrepreneurship	-5
Income Tax – Individuals	Increased contribution caps	Social insurance ceiling raised from 7× to 11× average wage	+92
Vehicle & Transport	Toll increase for freight	Higher road use fees	+100
	Highway vignette price increase	From €60 → €90 annually	+45
	Vehicle tax adjustment	Decrease for trucks (–€32M), increase for business passenger cars (+€27M)	-5
Expenditure Cuts	Parental pension savings	Cuts in parental bonuses	
	Healthcare wage moderation	Slower wage growth in public healthcare	+219
	Other operational savings	Across public sector	+124
SME Support	Threshold increase for 15% CIT rate	Raised from €60K → €100K	-4
	Dividend withholding tax reduced	Decrease from 10% → 7%.	-5

Source: authors' representation

One of the most considerable measures adopted is the increase in the corporate income tax rate. Starting in 2025, companies with annual revenues exceeding 5 million euros will be subject to a corporate income tax rate of 24%, up from the previous 21%. This progressive measure aims to increase the tax burden on large enterprises that are better positioned to absorb higher fiscal costs. Meanwhile, the government introduced a reduced corporate income tax rate of 10% for companies with revenues up to 100,000 euros, which is expected to support the growth and formalization of microenterprises and start-ups.

Simultaneously, the threshold for applying the 15% personal income tax rate for self-employed persons (SZČO) has been increased from 60,000 to 100,000 euros. This adjustment reflects an effort to simplify the tax burden for small business operators and provide greater incentives for entrepreneurship in lower-revenue categories.

Another major component of the consolidation package is the reform of dividend taxation. The withholding tax on dividends has been reduced from 10% to 7%. This measure is intended to enhance the attractiveness of investment

in Slovak companies and to encourage reinvestment of profits. By lowering the fiscal costs associated with profit distribution, the government aims to stimulate long-term capital formation and domestic reinvestment.

A controversial but significant measure introduced as part of the reform is the financial transaction tax. Effective from April 2025, all outgoing bank transactions from business accounts will be subject to a 0.4% tax, capped at 40 euros per transaction. Additionally, cash withdrawals will be taxed at a rate of 0.8%, and an annual fee of 2 euros will be applied to each business payment card. The rationale behind this measure is to broaden the tax base and secure a steady revenue stream. Nonetheless, this tax has drawn criticism from the Slovak Business Alliance and other employer associations, which argue that it disproportionately affects small and medium-sized enterprises (SMEs) and undermines the efficiency of digital financial operations.

Equally important is the adjustment in VAT policy. The standard VAT rate has been increased from 20% to 23%, while a new reduced rate of 19% has been introduced for food, electricity, and non-alcoholic beverages in restaurant services. The government has framed this measure as a compromise between revenue generation and social protection. By maintaining lower VAT on essential goods, the policy aims to cushion the negative effects on low-income households. However, the increase in the standard VAT rate is expected to contribute significantly to inflationary pressures, which could have broader macroeconomic consequences, including reduced real wages and purchasing power.

Beyond direct tax measures, the fiscal package also includes an expansion of excise duties. Taxes on tobacco products and alcoholic beverages are to be increased, and a new sugar tax is being introduced. These taxes serve a dual purpose: they are intended to improve public health outcomes by discouraging the consumption of harmful substances and to provide additional fiscal revenue. Furthermore, the government plans to reform environmental taxation, including the introduction of a carbon tax in selected industrial sectors. These changes reflect a broader shift towards green fiscal policy and the alignment of Slovakia's tax system with EU climate goals.

According to projections by the Council for Budget Responsibility (RRZ) for the 2024–2025 period, the adopted consolidation measures are expected to significantly improve Slovakia's public finances. In 2025, the public deficit is projected to decrease by 1.5% of GDP, representing one of the most substantial improvements in the fiscal balance over the past decade. The long-term effect will also be visible in the reduction of public debt, which is expected to decline by 5.9 percentage points by 2028, bringing Slovakia closer to meeting the criteria of the EU's Stability and Growth Pact. Despite these positive fiscal indicators, RRZ warns of short-term macroeconomic risks, particularly a slowdown in real GDP growth, which may temporarily decrease by 0.65% in 2026. However, in the long run, the consolidation is anticipated to contribute to lower risk premiums on public debt and create more favourable conditions for economic growth after 2027, especially through increased investor confidence and more efficient public finance management.

IMPACTS ON BUSINESS ENVIRONMENT

The implementation of the fiscal consolidation package has direct and indirect implications for the business environment and broader macroeconomic stability. On one hand, businesses—particularly small and medium-sized enterprises (SMEs)—face heightened operational costs due to the cumulative effect of new taxes, higher rates, and expanded obligations. The increase in the corporate income tax rate for high-revenue firms, while targeting fiscal equity, may lead to a reassessment of investment plans or reallocation of operations to more favourable tax jurisdictions. Similarly, the transaction tax imposes a recurring financial burden on businesses engaged in high-frequency payment activities, potentially incentivizing informal financial practices or offshore banking strategies.

Indirect taxes such as the VAT increase contribute to the overall cost burden by inflating input prices and reducing consumers' purchasing power. Businesses operating in price-sensitive sectors—such as retail, hospitality, and services—may experience compressed profit margins as they attempt to absorb some of the tax-driven price increases to retain customer loyalty. Although the government has introduced a reduced VAT rate for essential goods and services, the net impact is still expected to exert upward pressure on consumer prices, contributing to inflationary dynamics. Slovak firms face higher tax costs compared to neighbours (e.g., Czech Republic, Poland). Price competitiveness is threatened, especially in export sectors and low-margin industries.

Moreover, the introduction of the financial transaction tax has sparked concerns about the digitalization of the economy. In a period when Slovakia is promoting the transition to cashless transactions and e-commerce, the new tax may counteract these efforts by incentivizing cash-based alternatives or reducing the frequency of digital payments. Businesses operating in fintech, online retail, and service aggregation platforms might be disproportionately affected by the reduced competitiveness of digital financial channels.

From a macroeconomic standpoint, the short-term outlook includes a possible deceleration in private consumption, stemming from increased consumer prices and reduced disposable incomes. Higher taxes on dividends, alcohol, tobacco, and sugary products may also reduce household spending in specific categories, further altering consumption patterns. On the supply side, rising input and compliance costs may translate into reduced employment growth, lower wage dynamics, and a temporary decline in overall business sentiment.

Nevertheless, fiscal consolidation may also yield long-term gains by restoring confidence in Slovakia's macroeconomic management. A lower public deficit and stabilized debt trajectory can improve the country's sovereign credit rating, reducing borrowing costs for both the public and private sectors. In the medium term, businesses may benefit from a more predictable and transparent fiscal environment, which is essential for long-term planning, innovation, and foreign direct investment. If combined with parallel efforts in public administration reform, digitization, and reduction of regulatory burdens, fiscal consolidation may ultimately create a more competitive and resilient business environment.

It is also important to consider the sectoral heterogeneity of these impacts. While large corporations with diverse financing structures may be able to absorb fiscal changes with limited disruption, micro and small enterprises with narrow profit margins and limited administrative capacity may face disproportionate challenges. The same applies to self-employed professionals and sole traders who might lack the financial flexibility to cope with tax increases or additional reporting duties. Therefore, a nuanced understanding of the sector-specific implications is essential for assessing the broader economic consequences of the consolidation strategy. On the other hand, improved fiscal discipline, coupled with a credible medium-term fiscal framework, may enhance investor confidence and reduce the risk premium on Slovak sovereign debt. A more stable fiscal outlook could also create room for counter-cyclical fiscal policy in the event of future economic downturns.

CONCLUSIONS AND DISCUSSION

The business community has expressed a range of concerns regarding the consolidation package. Organizations such as the Republic Union of Employers (RÚZ) and the Slovak Business Alliance have warned that the new tax measures may erode Slovakia's regional competitiveness. In particular, they point to the financial transaction tax as an administrative burden and a cost factor that could reduce the appeal of Slovakia as an investment destination. Meanwhile, representatives of self-employed workers argue that the reforms may not sufficiently address the complexities and vulnerabilities of the small business sector.

International institutions have also taken part in the discussion. The International Monetary Fund (IMF) and the Organization for Economic Cooperation and Development (OECD) have acknowledged the necessity of fiscal consolidation but caution that revenue-side measures should be complemented by structural reforms on the expenditure side. These include improving the efficiency of public spending, reforming pension and healthcare systems, and enhancing the digitalization of public administration.

In conclusion, Slovakia's 2025 fiscal consolidation plan represents an ambitious and comprehensive response to the country's pressing fiscal challenges. The reform package incorporates a range of tax and non-tax measures designed to stabilize public finances and restore fiscal credibility. While the short-term effects may be challenging, particularly for the private sector, the long-term benefits of improved macroeconomic stability, lower debt levels, and enhanced investor confidence are significant. To ensure the success of the consolidation effort, the government must maintain policy consistency, strengthen institutional capacity, and pursue complementary reforms that support inclusive and sustainable growth. Striking a balance between fiscal discipline and economic vitality will be key to the success of this consolidation effort.

ACKNOWLEDGEMENT

The article was prepared within the framework of the project VEGA No. 1/0679/23 entitled "Zadlžovanie sa ekonomických subjektov a krajín v Európskej únii".

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ENHANCING AUTOMATION AND SUSTAINABILITY IN AI-DRIVEN MEDICAL IMAGING

Hafsa Laçi¹ and Kozeta Sevrani²

Abstract:

Integrating AI into medical imaging has proven to be efficient in terms of improved diagnoses, reduced time, and lower labor costs. It facilitates data sharing and enables safe collaborations between various institutions. Researchers are continuously focused on how to better integrate deep learning solutions in healthcare processes. However, they often neglect potential side effects, particularly concerning the sustainability of such initiatives. Some issues that might often be overlooked include energy consumption, environmental costs for storing and processing images, hardware waste, and ethical challenges.

In this paper, we aim to highlight the challenges and opportunities of adopting deep learning solutions in clinical settings with sustainability in mind. We utilized the MobileNetV3Small model to classify a dataset of PCOS ultrasound images, achieving a test accuracy of 97.02% while maintaining low energy consumption and carbon emissions. We discuss how, through DL, we can achieve responsible automation and innovation of healthcare processes. It is important that AI practices in medical imaging remain both sustainable and economically viable.

Keywords: Medical Imaging, Sustainability, Automation, Deep Learning

INTRODUCTION

Modern healthcare relies significantly on medical imaging to ensure accurate disease diagnosis and appropriate treatment for patients. One factor that determines whether to use artificial intelligence in this field is its potential economic impact (Wolff et al., 2020). To lower the costs associated with traditional manual solutions, AI, particularly deep learning (Shen et al., 2017) provides various efficient and automated workflows. These workflows enable the simultaneous processing of large volumes of images with high precision (Rajpurkar et al., 2018; Ronneberger et al., 2015).

However, the advancement in technology brings with it several environmental concerns related to resource and energy consumption. The greater the complexity of a deep learning model, the more computational resources are required to effectively utilize it. This raises important questions about the sustainability of AI models in the current context. As researchers aim to integrate deep learning models in the critical sector of healthcare, there is an increasing need for more lightweight and sustainable approaches to model development and deployment (Schwartz et al., 2019).

This study introduces a deep learning workflow designed to automate the classification of binary PCOS ultrasound images. The workflow is based on a lightweight model, MobileNetV3Small, and runs in a standard environment consisting of an Intel i7-10510U CPU and an NVIDIA GeForce MX330 GPU. The goal is to demonstrate that AI-based image classification can achieve both sustainability and accuracy. Many existing studies on medical image classification primarily focus on increasing model accuracy, often ignoring the associated energy costs. Furthermore, they typically do not report hardware-level resource usage and emissions on a per-epoch basis.

The authors aim to provide a complete view of both model quality and environmental impact by combining classification metrics (such as accuracy, precision, recall, F_1 score, and confusion matrix) with sustainability metrics (including hardware utilization, energy consumption, and CO₂ emissions). This approach enables informed decision-making regarding deployment in resource-constrained or environmentally sensitive settings.

LITERATURE REVIEW

Deep learning techniques have gained popularity for classification and segmentation tasks in medical imaging. (Esteva et al., 2017) compared the classification results of deep learning models for skin lesion detection with the assessments made by certified dermatologists. The findings revealed that the classification capabilities of deep learning models are comparable to those of human experts. After reviewing over 300 studies in the field of deep learning (DL) in medical imaging, (Litjens et al., 2017) concluded that these techniques have outperformed and replaced traditional models.

While the benefits of deep learning in the field of medicine, particularly in processing medical images, have become apparent, concerns about the environmental impact of these techniques have also grown. Specifically, carbon footprint and energy consumption are the most significant issues. (Selvan et al., 2022) conducted a

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comparison of four tools used in the literature to quantify carbon footprints. The measurements focused on the medical image segmentation task performed by a nnU-Net architecture. The study also discusses potential methods to reduce the environmental impact.

(Morand et al., 2024) examined the environmental impact of graphics card production used in AI models. They collected data on graphics cards manufactured between 2013 and 2023 to assess their production impact. They emphasize the importance of considering the entire hardware lifecycle, not just its usage, in order to accurately evaluate the environmental footprint of AI models. (Ahmed et al., 2022) combined U-Net architecture with an attention mechanism for image segmentation, enhancing performance while using a lightweight design.

(Mazurek et al., 2024) explored several energy-efficient compression methods and architectures for image segmentation. They implemented various strategies to enhance the data loading process, tested modern optimization techniques, and utilized only available resources to fine-tune parameters. As a result, they achieved good performance outcomes while reducing energy consumption. Meanwhile, (Ahmad et al., 2024) focused on predicting PCOS (Polycystic Ovary Syndrome) using three computationally efficient models: one based on Long Short-Term Memory (LSTM), another on Convolutional Neural Networks (CNN), and a third that combines both LSTM and CNN. In all instances, the SMOTE (Synthetic Minority Over-sampling Technique) was employed to balance the dataset. The highest accuracy achieved was 96.59%, which came from the CNN-based model.

METHODOLOGY

In this section, we discuss all the key components that are part of the procedure followed, as depicted in Figure 1. The process starts with choosing a balanced dataset and splitting it. After that, the data is preprocessed before serving it to the model as an input. It continues with training the MobileNetV3Small model and evaluates it on the test set. The process ends with a report on the classification and sustainability metrics.

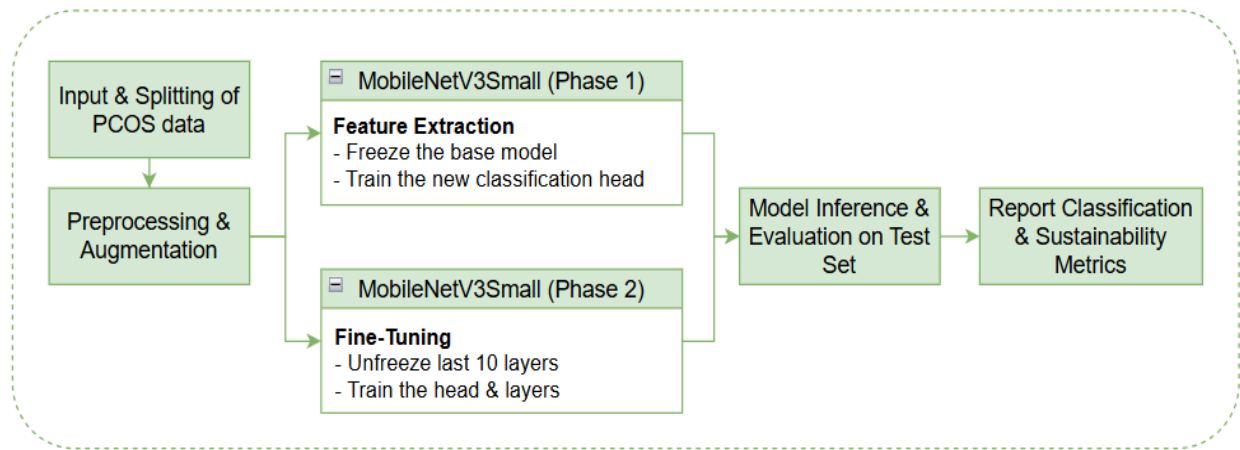


Fig. 1: The overall technical flow of the designed workflow

Dataset

To train and test the deep learning model, we have utilized a publicly available dataset (Indirani, 2024), which is freely accessible and intended to support research. The total data considered consists of 4838 samples, with 838 samples stored in a separate test folder. The remaining 4000 samples are divided into 70% for training (2800 samples) and 30% for validation (1200 samples). The data in each set is evenly balanced between ‘NON PCOS’ and ‘PCOS’ classes. The sample distribution among the training, validation, and test sets is detailed in Table 1.

Table 1: Distribution of samples in train, validation, and test sets

Class Name	Training Set	Validation Set	Test Set	Total
NON PCOS	1400	600	414	2414
PCOS	1400	600	424	2424
Total	2800	1200	838	4838

Preprocessing & Augmentation

Before training a deep learning model, it is important to preprocess and augment the data. Proper preparation ensures that the data is in the format the model expects, which is essential for effective learning. Images are

normalized as expected from the ImageNet pretrained MobileNetV3Small model and resized to 254 x 254 pixels. On each training image, we performed data augmentation by randomly rotating the images up to $\pm 15^\circ$, horizontally shifting the image by $\pm 10\%$ of its width, vertically shifting the image by $\pm 10\%$ of its height, horizontally flipping, and zooming in/out the image up to $\pm 10\%$.

Model Architecture & Experimental Environment

The classification model employed in this study uses MobileNetV3Small (pre-trained on ImageNet) as a backbone. The training strategy consists of two phases. The first phase is ‘Feature Extraction’, which starts with freezing all the 939K parameters used to train ImageNet and adds a new custom classification head. The latter is composed of a dropout layer with a 0.2 rate, a dense layer with 32 neurons and ReLU activation function, and a final dense layer with 1 neuron and Sigmoid function to bring a single probability for our binary classification (NON PCOS/PCOS). The newly added head is trained using Adam optimizer (learning rate $1e-3$) and binary cross-entropy loss function. The second phase is ‘Fine-tuning’, where we unfreeze the last 10 layers of the backbone and train them together with the custom head with a lower learning rate ($1e-5$). The considered batch size is 16. We train nearly 214K parameters, achieving high accuracy while maintaining a lightweight model that can be trained on modest hardware.

The experiment was conducted in a WSL2 environment on Windows 11, utilizing an Intel i7-10510U CPU and a NVIDIA GeForce MX330 GPU. TensorFlow 2.19.0 was used to implement and monitor the model.

Classification & Sustainability Metrics

In this study, we assess both model performance and environmental impact during the feature extraction phase, the fine-tuning phase, and the inference step. For classification, once the training is done, we provide a classification report showing results for accuracy, precision, recall, and F1 score of the model. We attach to this report the confusion matrix, counting true against predicted labels for the binary classification.

For sustainability, we use the GPUMonitorCallback to monitor the model’s VRAM and GPU utilization percentage during each epoch. While we also attempt to measure GPU power draw using `nvidia-smi`, this method is not feasible on the MX330 GPU. Additionally, through CodeCarbon 2.8.3, we estimate the total energy consumption (CPU+RAM energy) and calculate the CO₂ emissions (in kg CO₂eq) for each phase. Lastly, we provide information on the total inference time, CO₂ emissions during inference, and CO₂ emissions per inference.

RESULTS & DISCUSSION

In this section, we will analyze and assess our pipeline from two complementary perspectives: the quantification of classification performance and the impact on sustainability.

Classification Performance

The performance of the MobileNetV3Small pipeline was evaluated in both phases. In the feature extraction phase, the test accuracy reached 97.02% after 8 epochs. During the fine-tuning phase, the accuracy was slightly lower at 96.9%. The performance across classes (NON PCOS and PCOS) was well balanced, achieving a precision, recall, and F1 score of almost 97%. Moreover, the confusion matrix in Figure 2 indicates that from a total of 414 NON PCOS images, only 12 were misclassified. For PCOS images, only 14 out of 424 were misclassified.

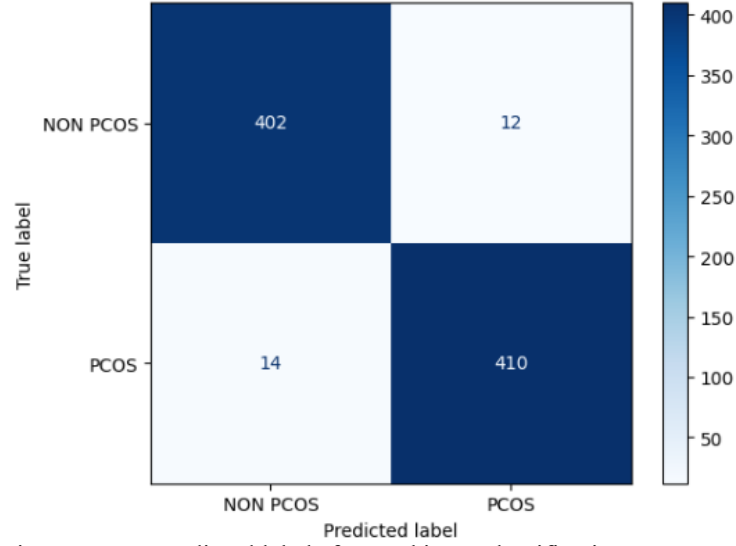


Fig. 2: Confusion matrix on true vs predicted labels for our binary classification

Sustainability Metrics

In the feature extraction phase, as shown in Table 2, the average training time per epoch was 102 s, with GPU utilization ranging between 0-20%, indicating a modest load. The total energy consumption (CPU+RAM) recorded by CodeCarbon was 3.55×10^{-3} kWh for a total phase duration of 920s, resulting in emissions of 8.63×10^{-5} kg CO₂ eq.

On the other hand, during the fine-tuning phase, the average training time per epoch decreased to 96 s, while GPU utilization varied more, ranging from 1% to 38%. The total energy draw slightly increased to 3.75×10^{-3} kWh for a total phase duration of 971.4s, leading to emissions of 9.11×10^{-5} kg CO₂ eq.

For the inference phase, predicting all 838 test samples took 4.7s (5.6×10^{-3} s per sample). The total energy consumed was 1.8×10^{-5} kWh, resulting in emissions of 4.37×10^{-7} kg CO₂ eq. Throughout all phases, the utilized VRAM remained constant at 1467 MiB, almost 72% of the total GPU capacity.

When considering all phases together, the total energy consumed by the model (CPU and RAM only) during the entire hot performance or steady-state runtime is 7.32×10^{-3} kWh. In comparison, the average annual energy required to recharge a smartphone is 2.34 kWh, which translates to a daily consumption of approximately 6.4×10^{-3} kWh (Heikkinen & Nurminen, 2012). Thus, the energy used by our model is roughly equivalent to the daily energy consumed when recharging a smartphone.

Table 2: Sustainability metrics evaluated for each phase of the model

Model Phases	Duration (s)	Utilized VRAM (MiB)	Avg GPU Utilization	CPU Energy (kWh)	RAM Energy (kWh)	Tot. Energy (kWh)	CO ₂ Emissions (kgCO ₂ eq)
Feature Extraction	920	1467	8%	3.19×10^{-3}	3.6×10^{-4}	3.55×10^{-3}	8.63×10^{-5}
Fine-Tuning	971.4	1467	12%	3.4×10^{-3}	3.8×10^{-4}	3.75×10^{-3}	9.11×10^{-5}
Inference (838 samples)	4.7	1467	-	1.6×10^{-5}	1.8×10^{-6}	1.8×10^{-5}	4.37×10^{-7}

The low percentage of GPU utilization indicates a minimal environmental impact. This suggests that the model can effectively handle concurrent workloads. It is well-suited for environments similar to the one we selected and can still perform well with larger batch sizes.

Limitations

Despite the advantages that our pipeline has in terms of performance and sustainability, some limitations are present. First, the dataset used was public, the classification was binary, and the image modalities were limited to

ultrasounds, which means we have not tested its generalization to other modalities. Additionally, testing the pipeline under WSL2 in Windows 11 on our NVIDIA MX330 may not accurately represent performance on native Linux setups or with other available GPUs. Furthermore, GPU power draw is not displayed through the nvidia-smi under WSL2, given that, couldn't assess the overall system's power footprint. However, considering the low percentage of GPU utilization, we estimate that additional power usage would be minimal and would not significantly impact the results.

Future initiatives could focus on addressing the issues mentioned by expanding and diversifying the dataset, boosting the utilization of the GPU, conducting training on multiple devices, and comparing results with real-world data. Additionally, they could include reporting on various sustainability metrics and benchmarking alternative lightweight backbones or models.

CONCLUSION

In this study, the authors explored the use of deep learning models for automated medical image classification while promoting sustainability. Considering that many clinics often lack the specialized GPUs needed to run these deep learning models, it is crucial to examine the environmental impact associated with their development, operation, and deployment.

We selected a total of 4,838 ultrasound images for polycystic ovary syndrome (PCOS) classification. The images were evenly distributed between two classes: NON-PCOS and PCOS. To ensure the model could operate effectively within our available computing resources, which consist of a NVIDIA GeForce MX330 GPU, we chose MobileNetV3Small as the base model for our task. With less than 1 million parameters, which means less energy consumption and reduced CO₂ emissions, this lightweight model achieved impressive performance. Our solution achieved a test accuracy of 97.02% and consumed only 7.32×10^{-3} kWh during training. Total CO₂ emissions were 1.78×10^{-4} kgCO₂eq.

This work contributes to responsible AI adoption, representing a step towards more energy-efficient and scalable deep learning solutions in medical imaging.

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PARCEL LOCKERS AS A LAST-MILE DELIVERY SOLUTION: A BIBLIOMETRIC REVIEW

Peter John Kilbourn¹ and Eric Mogire²

Abstract:

Significant growth in e-commerce in the last decade has intensified the demand for efficient and effective last-mile delivery of products to customers. Parcel lockers have been identified as an alternative node of last-mile delivery that offers potential benefits, including cost reductions, improved convenience, and reduced environmental impact. Existing research on the use of parcel lockers in last-mile delivery is, however, fragmented across disciplines, and study results may be influenced by regional differences. To that end, there is a need for a comprehensive understanding of the role of parcel lockers in last-mile deliveries. This study comprises a bibliometric review of 168 publications extracted from the Scopus database. Results revealed that research on the topic surged post-2020, peaking in 2024. Key themes include logistics and user experience, with uneven global participation and emerging trends in automation. Future research should explore parcel locker adoption, assess regulatory and urban planning frameworks, and apply AI and predictive analytics. Studies should also broaden the geographic scope, especially in developing regions like Africa, and examine emerging models like peer-to-peer and B2B lockers.

Keywords: parcel locker, last-mile delivery, bibliometric review

INTRODUCTION

The rapid growth in electronic commerce (e-commerce) over the last decade has substantially increased the demand for last mile delivery. According to Olsson et al. (2019), last mile delivery relates to a set of activities required to complete the physical delivery of goods to the destination chosen by the customer. It is considered one of the most complex, costly, and inefficient processes in the e-commerce sector (Mismar et al., 2022). The complexity can be attributed to the increasing parcel volumes and time pressures arising from growth in online sales (Mohammad et al., 2023), necessitating more delivery vehicles on the roads. As a result, last mile delivery faces challenges such as traffic congestion, environmental pollution, and high operational costs (Mogire et al., 2022; Mohammad et al., 2023).

Parcel lockers have been proposed to improve last-mile delivery by providing lockable storage boxes for customer package pickup (Encarnación & Amaya, 2025). Iwan et al. (2016) describe them as unattended delivery machines located in accessible areas. Typically found at post offices, transit stations, stores, and universities (Mohammad et al., 2023; Encarnación & Amaya, 2025), there are fixed lockers for 24/7 access and mobile lockers that are temporarily placed to minimise distance and costs (Kötschau et al., 2023). Smart parcel lockers enhance earlier models with contactless delivery, automated notifications, and secure identity verification (Che et al., 2022) and are the focus of this study.

The use of parcel lockers as a last-mile solution benefits both customers and e-commerce companies. They provide a self-service option, allowing customers to pick up parcels at their convenience (Cieśła, 2023; Mohammad et al., 2023; Boroujeni et al., 2025; Ozyavas et al., 2025). In the USA, studies show that men who are motivated by potential gains are more inclined to use parcel lockers when they encounter messages that emphasise the downsides of home delivery, particularly related to environmental concerns, security, or convenience. (Rose et al., 2025). For retailers, parcel lockers facilitate delivery consolidation and optimised routes, resulting in lower operating costs and less traffic (Mohammad et al., 2023; Encarnación & Amaya, 2025; Ozyavas et al., 2025). Norwegian research suggests that increased parcel locker deliveries enhance last-mile efficiency, providing both economic and environmental benefits (Dong et al., 2023). However, challenges remain, including the need for a dedicated application, the number and location of stations, and security concerns (Cieśła, 2023; Encarnación & Amaya, 2025; Ozyavas et al., 2025).

A search of existing studies in the Scopus database on parcel lockers in last mile delivery found fragmented studies across disciplines, with results influenced by regional differences. Existing research has addressed fragmented aspects such as consumer adoption (Tsai & Tiwasing, 2021; Encarnación & Amaya, 2025), operational efficiency (Iwan et al., 2016; Dong et al., 2023), sustainability (Ozyavas et al., 2025), and integration with other delivery innovations (Lemardelé et al., 2021; Boroujeni et al., 2025). The preliminary search identified one systematic review focusing on determinants of consumer adoption and experiences with parcel lockers in Vietnam during the COVID-19 (Tsai, Ngo, & Che, 2024). The study lacked a quantitative bibliometric analysis and focused only on Vietnam. Although there is existing literature, there is a lack of comprehensive analysis synthesising development

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in the study topic, identifying leading contributors, and mapping themes over time. To address this gap, the current study conducts a bibliometric review to develop a comprehensive understanding of current research on the role of parcel lockers in last-mile logistics.

- i. To map publication trends and productivity in parcel locker research.
- ii. To examine collaboration patterns among authors and countries.
- iii. To identify key themes and conceptual clusters.
- iv. To uncover gaps and propose a future research agenda.

RESEARCH METHODOLOGY

This study adopted a bibliometric analysis to investigate existing publications on parcel lockers in last mile delivery. Bibliometric analysis helps explore many publications to identify patterns, trends, and relationships in a topic (Donthu et al., 2021). A search was conducted on 30 March 2025, covering publications from 2014 to 2025 published in English in the Scopus database. The keywords used in the search included: TITLE-ABS-KEY (((("last mile deliver*" OR "last-mile deliver*" OR "last mile logistics" OR "last-mile logistics" OR "last mile distribution" OR "last-mile distribution" OR "final mile delivery" OR "final-mile delivery") AND ("parcel locker*" OR "package locker*" OR "smart locker*" OR "smart parcel locker*" OR "smart package locker*" OR "drop box*" OR "automated parcel locker*" OR "self-service locker*" OR "delivery locker*" OR "e-locker*" OR "click-and-collect locker*" OR "pickup locker*" OR "e-commerce locker*" OR "contactless pickup station*" OR "last-mile locker*" OR "courier locker*" OR "parcel pickup station*" OR "automated locker*" OR "packstation*" OR "Amazon Locker*" OR "Pick-Up Drop-Off) station*" OR "PUDO station*")))) AND (EXCLUDE (EXACTKEYWORD, "Locks (fasteners)")) AND (LIMIT-TO(LANGUAGE, "English))). The extracted publications were exported from Scopus in BibTeX format. A detailed data cleaning process was followed, involving the removal of duplicates and publications that were outside the scope of the study, resulting in 158 publications. The cleaned dataset was analysed using the Bibliometrix package (version 4.3.0) in RStudio, with the Biblioshiny web interface. Table 2 summarises the main information about the publications and the findings presented in the results section. Research on the topic has grown since 2014, with a high annual growth rate of 27.52%. Among the 168 publications, 116 (69.04%) are articles, and six (3.57%) are reviews (Table 2).

Table 2. Main information about the publications

Description	Results
Timespan	2014:2025
Sources (Journals, Books, etc)	100
Documents	168
Annual Growth Rate %	27.52
Document Average Age	2.45
Average citations per document	21.11
References	0
DOCUMENT CONTENTS	
Keywords Plus (ID)	680
Author's Keywords (DE)	529
AUTHORS	
Authors	467
Authors of single-authored docs	10
AUTHORS COLLABORATION	
Single-authored docs	10
Co-Authors per Doc	3.46
International co-authorships %	31.55
DOCUMENT TYPES	
article	116
book chapter	10
conference paper	36
review	6

Source: Authors' own

RESULTS

This section provides results, focusing on performance analysis and science mapping on the topic.

Performance analysis

Figure 1 shows how research interest in parcel lockers has evolved. For the first six years, interest was limited, but 2020 brought a surge, likely due to the impact of the pandemic and rising e-commerce needs. 2024 was the peak year with 40 publications, and 2025 already shows strong output despite being incomplete. This trend highlights parcel lockers as a rapidly growing area in last mile delivery research.

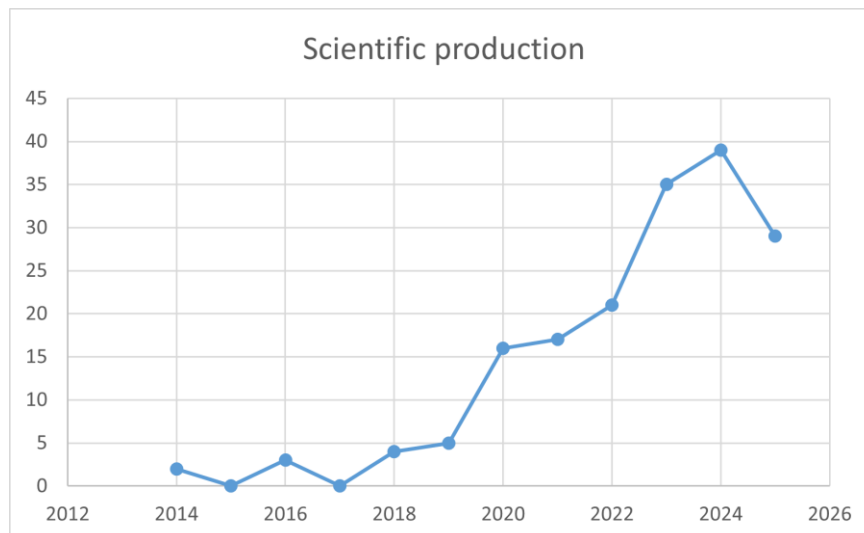


Figure 1. Publications per year

Source: Authors' own

Most impactful journals

Table 3 shows that the *Sustainability* journal has the highest research impact on the topic, with eight publications, an h-index of 7, an m-index of 1.167, and 162 total citations counted from 2016. The *Sustainability* journal mainly focuses on optimising logistics systems. The list of impactful journals reveals that research on parcel lockers as a last mile delivery solution is primarily rooted in transportation and logistics scholarship, with significant contributions from disciplines like sustainability, consumer behaviour, urban studies, and quantitative modelling/engineering. This affirms the interdisciplinary nature of the field and the broad academic interest in studying this topic.

Table 3. Top 10 most impactful journals

Rank	Journal	h-index	g-index	m-index	TC	NP	PY-start
1	Sustainability (Switzerland)	7	8	1.167	162	8	2020
2	International Journal of Physical Distribution and Logistics Management	6	7	0.857	468	7	2019
3	Transportation Research Procedia	6	9	0.5	742	9	2014
4	Transportation Research Part E: Logistics and Transportation Review	5	9	0.833	285	9	2020
5	Journal of Retailing and Consumer Services	4	4	0.571	344	4	2019
6	Mathematics	4	5	1	102	5	2022
7	Journal of Transport Geography	3	4	0.375	125	4	2018
8	Logistics	3	5	0.6	71	5	2021
9	Research in Transportation Economics	3	4	1	26	4	2023
10	Transport Policy	3	3	0.6	40	3	2021

Source: Authors' own.

Most impactful authors

Table 4 shows that *Wang, Y.* is the most productive author with five publications, an h-index of 5, a g-index of 5, and 170 total citations computed from 2020. *Wang, Y.* primarily focuses on optimising parcel lockers to improve efficiency and support sustainable last mile delivery. *Dablanc, L.* is the most productive veteran author who started

publishing on the topic in 2014 (Table 3). The author focuses on using parcel lockers to solve urban last mile challenges. *Pilla, F.* is the most productive emerging author with three publications, an m-index of 1, and 24 total citations computed from 2023 (Table 3). *Pilla, F.* focuses on using advanced, participatory, and hybrid decision-making methods for selecting optimal parcel locker locations.

Table 4. Top 10 impactful authors

Rank	Author	h-index	g-index	m-index	TC	NP	PY_start
1	Wang, Y.	5	5	0.833	170	5	2020
2	Schnieder, M.	4	5	0.667	53	5	2020
3	Wang, X.	4	5	0.571	258	5	2019
4	Bi, M.	3	3	0.5	53	3	2020
5	Chen, Y.	3	3	0.5	53	3	2020
6	Dabanc, L.	3	3	0.25	260	3	2014
7	Fang, M.	3	3	0.6	124	3	2021
8	Hinde, C.	3	3	0.6	47	3	2021
9	Mangiaracina, R.	3	4	0.3	341	4	2016
10	Pilla, F.	3	3	1	24	3	2023

Source: Authors' own.

Author affiliations

Table 5 indicates the institutions where the authors are working. Authors on the topic have affiliations with institutions from different countries. These countries include China, the USA, South Korea, Germany, and Taiwan. Such broad representation shows that research on the topic is highly collaborative and globally relevant.

Table 5. Author affiliations

Rank	Affiliation	Frequency
1	Chung-Ang University	7
2	Beijing University of Technology	5
3	Nanyang Technological University	5
4	National Taipei University of Technology	5
5	Friedrich-Schiller-Universität Jena	4
6	Loughborough University	4
7	Thuongmai University	4
8	Agh University of Science and Technology	3
9	Delft University of Technology	3
10	Eindhoven University of Technology	3
11	Institute of Transport Economics	3
12	Institute of Transport Research	3
13	Korea University Business School	3
14	National Taiwan University of Science and Technology	3
15	Politecnico Di Milano	3
16	Public University of Navarre	3
17	Technical University of Denmark	3
18	The University of Melbourne	3
19	University College Dublin	3
20	University of Catania	3

Source: Authors' own.

SCIENCE MAPPING

Co-authorship analysis

The country collaboration analysis reveals a globally distributed but uneven research network (Figure 2). Germany emerges as a central hub in Europe, partnering frequently with France, Spain, and the USA. China is increasingly active, especially with other Asian countries and the USA. The network suggests a growing emphasis on transnational cooperation, particularly across Europe and Asia-Pacific. The USA, China, Germany, Italy, and France have high involvement, while countries like Brazil and Australia have moderate involvement. Low involvement was recorded in developing economies such as South Africa, Egypt, and India.

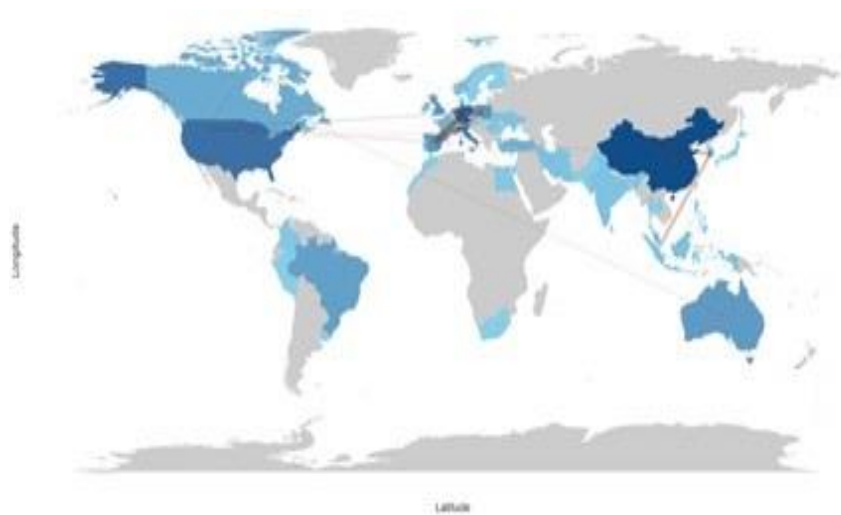


Figure 2. Country collaboration map
Source: Authors' own.

Word analysis

For the bibliometric analysis, a comprehensive synonyms list was compiled after evaluating several iterations of the Most Frequent Words reports produced through a Biblioshiny analysis. This synonyms list was used for all keyword analysis in this study. Table 6 shows that the most dominant author's keywords with the highest frequencies are *last mile delivery* and *parcel locker*, confirming the focus of the study. It also implies that parcel lockers are a promising solution to last mile delivery challenges. The moderate occurring keywords include *urban logistics*, *e-commerce*, *last-mile logistics*, and *sustainability*. These keywords reflect the broader context in which parcel lockers are studied, particularly emphasising e-commerce, urban environments and sustainability. The less dominant lower-frequency keywords include *vehicle routing*, *location problem*, *crowd logistics*, *crowd shipping*, *parcel delivery*, *cargo bike*, *cargo bike*, *discreet choice modelling*, *home delivery*, and *urban freight transport*. Their presence indicates the specific problems and alternative solutions being investigated. Thus, the list of most frequent words highlights that this research is deeply embedded in urban environments, driven by e-commerce, and increasingly concerned with sustainability and innovative operational models.

Table 6. Top 50 most frequent words

Rank	Word(s)	Frequency	Rank	Word(s)	Frequency
1	last mile delivery	88	26	simulation	4
2	parcel locker	79	27	b2c e-commerce	3
3	urban logistics	29	28	covid-19	3
4	e-commerce	25	29	crowd-shipping	3
5	last mile logistics	21	30	e-commerce logistics	3
6	sustainability	12	31	last mile	3
7	vehicle routing	11	32	micro-depot	3
8	location problem	9	33	public transport	3
9	crowd logistics	7	34	service quality	3
10	crowd shipping	6	35	structural equation modelling	3
11	logistics	6	36	theory of planned behavior	3
12	parcel delivery	6	37	adaptive large neighborhood search	2
13	cargo bike	5	38	agent-based model	2
14	discrete choice modelling	5	39	agent-based simulation	2
15	home delivery	5	40	analytic hierarchy process	2
16	urban freight transport	5	41	autonomous delivery robot	2
17	autonomous delivery	4	42	autonomous vehicles	2
18	b2c	4	43	cities	2

Rank	Word(s)	Frequency	Rank	Word(s)	Frequency
19	delivery preferences	4	44	city logistics management	2
20	last-mile	4	45	collection and delivery point (cdp)	2
21	literature review	4	46	consumer behavior	2
22	mobile parcel locker	4	47	consumer preferences	2
23	optimization	4	48	customer satisfaction	2
24	delivery	4	49	customer value	2
25	simulation	4	50	delivery option	2

Source: Authors' own

Co-occurrence network

A keyword co-occurrence network was developed to obtain insights into the thematic structure and relational centrality of concepts within the bibliometric dataset. Figure 3 depicts this co-occurrence network and reveals two main thematic clusters. The core cluster comprises keywords including *last mile delivery*, *parcel lockers*, *home delivery*, *urban logistics*, *sustainability*, and *cost/sales/profit* themes. The terms discussed are closely connected and highlight operational, logistical, and environmental aspects of last-mile delivery systems. Key terms such as *last mile*, *last mile delivery*, and *parcel locker* play a significant role in their positioning and impact. Additionally, concepts like sustainability, cost reduction, sales, and profitability are often associated with these operational keywords, indicating that economic and environmental factors are commonly addressed together in the literature on last-mile logistics.

The secondary cluster includes the following key concepts: e-commerce, logistics, consumer behaviour, and freight transportation. This cluster illustrates a broader economic and consumer demand landscape, representing a related yet separate conceptual domain. Although Cluster 2 is smaller, it indicates that studies focusing on consumers—such as consumption behaviour and logistics in e-commerce—are an evolving thematic area. These aspects may not have been thoroughly examined concerning parcel lockers and last-mile delivery issues. Peripheral nodes, including crowd-sourcing and public transport, suggest the emergence of new and alternative delivery methods. These elements are less densely connected, indicating that while still in the early stages of development, they point to innovative research opportunities in last-mile delivery.

These findings highlight the multifaceted nature of last-mile delivery research, balancing operational concerns with consumer behaviour and systemic logistics.

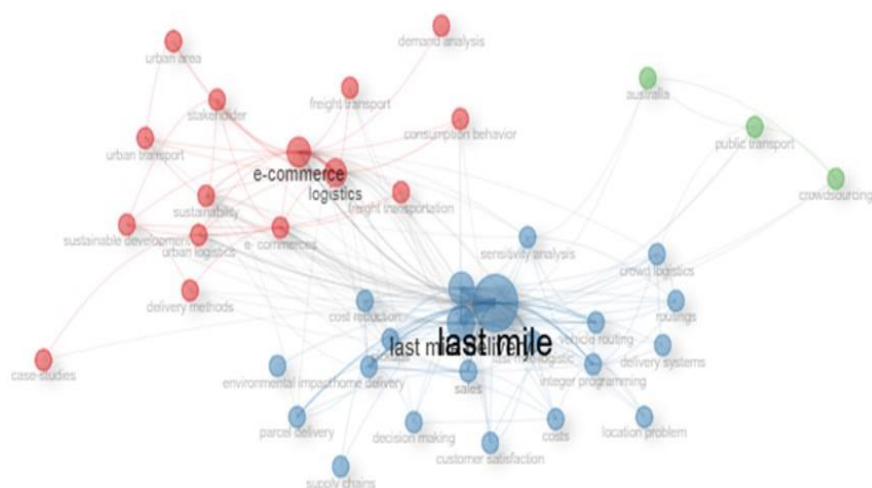


Figure 3. Co-occurrence network

Source: Author's own

Thematic map

Thematic mapping helps identify themes from publications, categorising them as motor, basic, declining/emerging, and niche themes (Luke & Mageto, 2023). Motor themes like *delivery preferences* and *service quality* form the foundation of parcel lockers for last mile delivery (Figure 4). This suggests that delivery preferences and service quality influence parcel locker strategies in last mile delivery. *Parcel locker* is listed as a basic theme, pointing to its foundational but developing area of research on the topic. In contrast, as a motor theme, *automated*

parcel locker reflects its central and influential role in driving last mile delivery innovations. *Sustainability* as a basic theme confirms its role as a foundational consideration in last mile delivery research. The niche themes, such as *location problem*, highlight ongoing research on enhancing optimal locker placement for greater efficiency and accessibility in urban areas. The emerging or declining themes (forward-looking topics) include engaging with innovations such as *autonomous delivery robots* and *collection and delivery points*. Thus, the thematic map indicates that parcel lockers are a fundamental concept and an actively optimised solution driven by technological advancements, strategic planning, and a strong focus on customer satisfaction and sustainability.

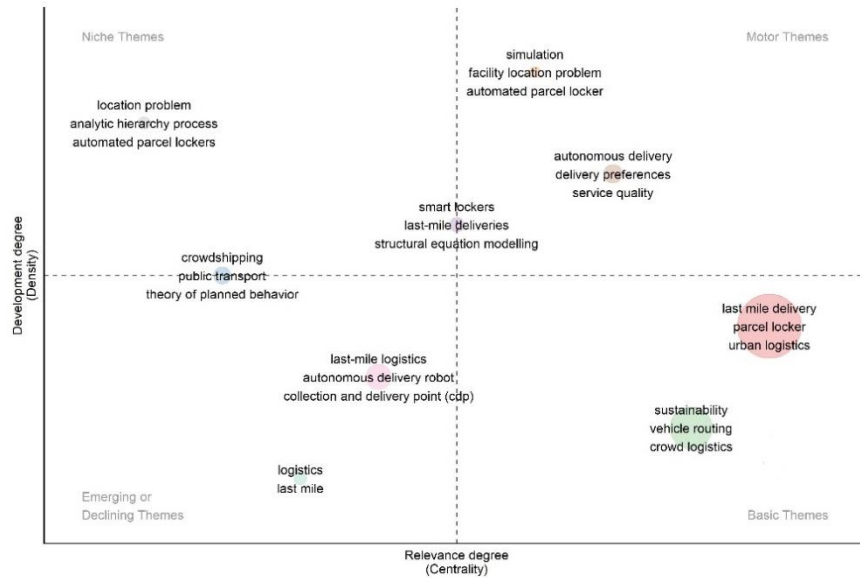


Figure 4. Thematic map
Source: Authors' own.

Thematic evolution

Between 2014 and 2019, research focused on broad themes such as *e-commerce* and *consumption behaviour* (Figure 5). This emphasised that understanding online purchasing patterns is essential due to the growth of digital commerce. Between 2020 and 2021, new themes emerged, including *autonomous delivery robots*, *parcel delivery*, and *information systems*, reflecting a growing technological and operational interest in optimising last mile delivery. From 2022 to 2024, research shifted towards urban infrastructure issues, including *public transport*, *freight transport*, and *city logistics*. This implies that urban infrastructure serves as the backbone of efficient last mile delivery. Post-2025, *routing* and *parcel lockers* are identified as notable themes. This shows a shift to specialised technology-driven solutions to solving last mile delivery challenges.

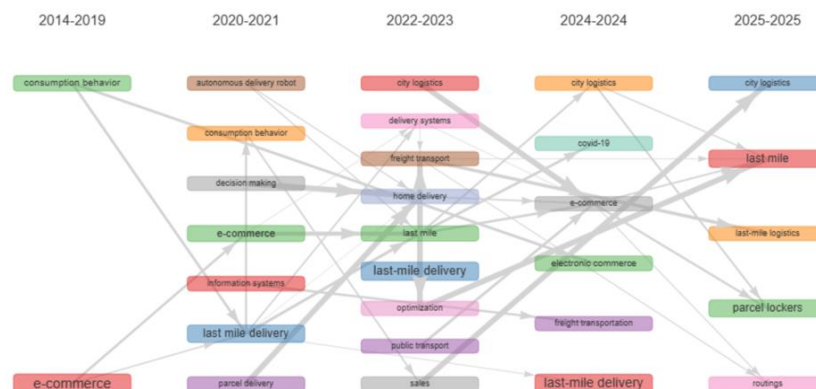


Figure 5. Thematic evolution
Source: Authors' own

Citation analysis

Citation analysis helps identify seminal works on a topic (Mogire et al., 2025). The most cited publication, authored by Mangiaracina et al. (2019), has 38.71 citations per year, reviewing literature on innovative last mile delivery solutions (Table 7). The high citation count per year suggests this is a groundbreaking study on the topic, addressing the many innovative solutions, including parcel lockers for last mile delivery efficiency.

Table 7. Top 10 most globally cited publications

Rank	Authors	Total citations per year	Title	Summary of publication
1.	Mangiaracina et al. (2019)	38.71	Innovative solutions to increase last mile delivery efficiency in B2C e-commerce: a literature review	The study reviewed 75 publications on innovations to improve last mile delivery efficiency in B2C e-commerce. Results identified key cost drivers and highlighted innovative last mile delivery solutions such as parcel lockers and crowdsourcing.
2.	Lemardelé et al. (2021)	28.60	Potentialities of drones and ground autonomous delivery devices for last mile logistics	The study developed a mathematical formulation to approximate operational costs and externalities estimated for ground autonomous delivery devices with (a) urban consolidation centers and (b) truck-launched unmanned aerial vehicles in France and Spain. Results showed ground autonomous delivery devices are more cost-effective in dense areas like Spain.
3.	Iwan et al. (2016)	26.70	Analysis of parcel lockers' efficiency as the last mile delivery solution – the results of the research in Poland	This study analysed the usability and efficiency of parcel lockers in Poland. Results showed that proper location is the most important factor in the efficiency of parcel lockers.
4.	Vakulenko et al. (2018)	23.38	What's in the parcel locker? Exploring customer value in e-commerce last mile delivery	The study explored how customers perceive value using parcel lockers for e-commerce deliveries in Sweden. Results showed that parcel lockers create customer value in four areas: functional, emotional, social, and financial.
5.	Yuen et al. (2019)	21.29	The determinants of customers' intention to use smart lockers for last-mile deliveries	The study investigated the determinants of using smart lockers for last mile delivery in China. Perceived value strongly influences customers' intention to use smart lockers, followed by reliability and convenience.
6.	Kiba-Janiak et al. (2021)	20.80	Sustainable last mile delivery on e-commerce market in cities from the perspective of various stakeholders: literature review	The study reviewed 161 publications on sustainable last mile delivery trends in urban e-commerce markets. Results showed that recent publications highlight new technological solutions such as parcel lockers.
7.	Morganti et al. (2014)	20.50	The impact of e-commerce on final deliveries: alternative parcel delivery services in France and Germany	The study analysed key drivers behind developing pick-up points and parcel lockers in France and Germany. Results showed that alternative delivery solutions are growing, used by 20% of customers in France and 7% in Germany.

8.	Tsai, and Tiwasing (2021)	20.40	Customers' intention to adopt smart lockers in last mile delivery service: a multi-theory perspective	The study investigated determinants of consumers' intention to use smart lockers in Thailand. Results showed that privacy, convenience, security, reliability, compatibility, relative advantage, perceived behavioural control, and attitude influence the intention to use smart lockers.
9.	Schwerdfeger, and Boysen (2020)	19.33	Optimising the changing locations of mobile parcel lockers in last-mile distribution	This study explored mobile parcel lockers that can relocate during the day to enhance delivery reach and flexibility in last mile delivery. Results reveal that considerably more lockers (i.e., up to 400%) are required when applying stationary instead of mobile lockers.
10.	Merkert et al. (2022)	17.00	Consumer preferences for innovative and traditional last mile parcel delivery	This study examined customer preferences in Australian delivery solutions. Results showed that parcel lockers are favoured when delivery security is a concern.

Source: Authors' own

Table 6 shows seminal publications on the topic focusing on three main themes: operational efficiency, customer adoption, and sustainability considerations. The operational efficiency of parcel lockers is largely influenced by their location, which determines usability (Iwan et al., 2016). In addition, mobile parcel lockers enhance delivery flexibility and reach, requiring fewer lockers compared to stationary models (Schwerdfeger & Boysen, 2020). The theme of customer adoption pertains to various factors influencing users' acceptance of parcel lockers. Customers are more inclined to use parcel lockers when they find them valuable, reliable, and convenient (Yuen et al., 2019). Security, privacy, and compatibility also strongly determine customers' willingness to adopt parcel lockers (Tsai & Tiwasing, 2021). Parcel lockers cater to diverse consumer preferences by offering functional, social, emotional, and financial values (Vakulenko et al., 2018). Finally, sustainability considerations position parcel lockers among the environmentally favourable delivery solutions (Kiba-Janiak et al., 2021). Most studies rely on cross-sectional surveys, modelling, or literature reviews, with few addressing operational deployment and user behaviour over time in real-world urban settings. In addition, the studies cover a broad geographic range, with a strong focus on Europe (France, Germany, Poland, Spain, Sweden), Asia (China, Thailand), and Australia.

DISCUSSION

The trend in research on parcel lockers in last mile delivery has significantly increased, particularly since 2020. This surge is likely driven by the COVID-19 pandemic and the rapid growth of e-commerce. A performance analysis indicates that 2024 will be the most productive year, with 40 publications, while 2025 is already showing strong output. Research in this area is primarily rooted in transportation and logistics, but some studies also explore consumer behavior, sustainability, and urban systems. High-impact journals, such as *Sustainability*, have played a crucial role in shaping research on parcel lockers in last mile delivery, particularly by highlighting how these lockers contribute to making last mile delivery more efficient and environmentally friendly.

Collaboration analysis reveals a globally distributed yet uneven research network. Countries like Germany, China, and the United States serve as central nodes in international co-authorship networks, frequently partnering with other leading research economies across Europe and Asia-Pacific. Institutional affiliations reflect broad global representation with strong participation from countries such as China, the USA, South Korea, Germany, and Taiwan. However, representation from developing economies, particularly those in Africa, remains limited, suggesting future opportunities to broaden research inclusivity and encourage capacity building.

Science mapping techniques, including keyword analysis, co-occurrence network, and thematic mapping, reveal *parcel lockers* and *last mile delivery* as dominant topics. These are closely linked to three main themes: operational efficiency, customer adoption, and sustainability considerations. Emerging terms like *crowd-sourcing*, and *public transport* point toward a future-oriented research agenda focused on innovative consumer-driven and multimodal last mile delivery models. The conceptual clusters mainly relate to operational/ technical domains and business/ consumer domains, illustrating the dual emphasis on system efficiency and user experience within the topic.

CONCLUSION

Parcel lockers play a crucial role in last mile delivery research, which is evolving but still needs interdisciplinary and geographic expansion. Despite the growing literature on the topic, gaps remain, particularly in behavioural studies using proven technology acceptance theories and analysis of new business models like peer-to-peer and B2B applications. Current research also tends to overlook regulatory matters and advanced analytics, including AI and machine learning. Additionally, the uneven distribution of regional studies, with a notable lack of representation from Africa, underscores the need for broader geographic perspectives.

Managers should prioritise the use of parcel lockers in last-mile delivery strategies. Key focus areas should include placement, enhancing user experience, and utilising smart technologies to meet the demands of e-commerce and sustainability. Global collaboration is essential for scaling solutions in underrepresented regions. The field should integrate theories from logistics, urban planning, and consumer behaviour while also exploring themes such as regulation and AI optimisation.

This study relies on the Scopus database, which may exclude relevant publications. Future reviews should include sources, such as Web of Science and Google Scholar, and incorporate non-English publications for a more comprehensive view of the topic.

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ENHANCING TECHNOLOGY TRANSFER AND SUSTAINABLE ENTREPRENEURSHIP IN EMERGING OPEN INNOVATION ECOSYSTEMS

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Abstract:

In the context of widening countries striving to build knowledge-based economies, understanding the factors that influence technology transfer and innovation commercialization is both timely and essential. Transitional ecosystems often face complex institutional, financial, and policy-related challenges that hinder their innovative potential. This study addresses this gap by examining the key enablers and obstacles that shape sustainable entrepreneurship and technology adoption in emerging open innovative environments. The study proposes and empirically tests a research model that investigates the effects of barriers to technology transfers, financial support conditions, and government incentives on two critical outcomes in emerging innovation ecosystems: Technology Transfer Readiness (TTR) and Commercialization Capability (CC). Drawing on open innovation theory and entrepreneurial ecosystem frameworks, the model is grounded in data collected from over 100 experts across four widening countries: Serbia, Albania, Bosnia & Herzegovina, and North Macedonia. Preliminary results suggest that while barriers significantly hinder both technology transfer and commercialization, strong financial and policy frameworks act as critical enablers. This study contributes to the literature on innovation management and policy by offering a context-sensitive model tailored to transitional economies. The findings provide practical insights for designing evidence-based interventions that strengthen institutional capacity, enhance cross-sector collaboration, and accelerate innovation commercialization in emerging regions.

Keywords: Technology transfer readiness, commercialization capability, financial support, government incentives, open innovation, emerging economies, sustainable entrepreneurship, widening countries

INTRODUCTION

In the contemporary global economy, technology transfer and sustainable entrepreneurship have become pivotal elements in fostering innovation, enhancing competitive advantages, and driving sustainable economic growth, particularly within open innovation ecosystems. Emerging economies are increasingly adopting open innovation approaches to stimulate economic growth and improve competitiveness. Such ecosystems, characterized by intensive collaboration between academia, industry, governmental institutions, and society, provide a fertile environment for knowledge generation and technology commercialization (de las Heras-Rosas et al., 2021; Borah, Massini & Malik, 2023). However, despite the apparent benefits, these collaborations often face numerous barriers, such as institutional misalignment, limited financial resources, cultural divergences, and insufficient policy support (Bruneel & D'Este, 2010; Orazbayeva et al., 2020).

Recent research highlights that successful collaboration in open innovation ecosystems necessitates robust structures that address specific stakeholder interests and clearly defined roles for each actor (Orazbayeva et al., 2020). Additionally, it has become evident that promoting sustainable entrepreneurship within these ecosystems not only advances economic development but also contributes to broader societal and environmental goals (Minutiello et al., 2024). Sustainable entrepreneurship represents a holistic approach to innovation, encouraging entrepreneurial initiatives that balance economic growth, social equity, and environmental responsibility. Despite the promising prospects, Western Balkan transition economies—such as Serbia, Albania, Bosnia & Herzegovina, and North Macedonia—face distinct challenges due to financial constraints, weak intellectual property rights enforcement, and fragmented support policies (Gracia-Laborda et al., 2023). Addressing these challenges requires targeted strategies that facilitate effective technology transfer and strengthen collaborative ties among stakeholders.

While high-income countries have made substantial progress in building such ecosystems, Western Balkan transition economies or in EU terms referred to widening countries (e.g., Serbia, Albania, Bosnia & Herzegovina, and North Macedonia) continue to struggle with systemic barriers that hinder effective knowledge transfer and innovation uptake. Despite a growing number of public and private initiatives aimed at improving innovation capacity, the disconnect between research and commercialization, the lack of targeted financial instruments, and the absence of coherent policy incentives remain persistent obstacles.

This study responds to these gaps by proposing and empirically testing a research model that examines how three key groups of factors—Barriers to Technology Transfer (BTT), Financial Support Conditions (FSC), and

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Government Incentives (GI)—influence two critical organizational outcomes: Technology Transfer Readiness (TTR) and Commercialization Capability (CC). Drawing on theories of open innovation and entrepreneurial ecosystems, the model is tested using quantitative data gathered from innovation-active organizations in four widening countries.

By investigating the interplay between institutional constraints and enabling mechanisms, this research aims to produce context-sensitive insights that can inform policy design, institutional strategies, and capacity-building efforts in developing innovation ecosystems. The results will offer actionable recommendations for improving technology transfer processes and fostering sustainable, innovation-driven entrepreneurship in regions with untapped potential.

In this context the main Research Question (RQ) could be summarized into the following: To what extent do institutional voids and government interventions shape the success of technology transfer and sustainable entrepreneurship in transitional innovation ecosystems? The study aims to explore how barriers to technology transfer, financial support conditions, and government incentives influence the development of sustainable entrepreneurship and commercialization capabilities in emerging innovation ecosystems.

Objectives:

- Identify enablers and obstacles in the context of widening countries.
- Analyze the impact of financial and governmental interventions on technology transfer readiness and commercialization.
- Empirically test a model based on data from four Western Balkan countries.

LITERATURE REVIEW

Theoretical Background

The research paper is grounded in theories of Open Innovation, Technology Transfer, and Entrepreneurial Ecosystem Development, particularly in the context of emerging or transitional economies. According to Chesbrough's Open Innovation Theory (Chesbrough, 2003), organizations must actively leverage external ideas and pathways to market alongside internal ones. Entrepreneurship and technology markets became more closely linked with open innovation due to their mutual emphasis on innovation. (Kuan, 2020). Although initially focusing on larger companies scholars within the segment of entrepreneurial thought have also demonstrated how networked innovation ecosystems help overcome resource constraints and stimulate growth. (Lee et al., 2010) Effective open innovation depends on institutions' readiness to absorb knowledge and their capacity to commercialize it. This includes both internal enablers (readiness) and external drivers (ecosystem support).

In addition to the open innovation and entrepreneurial ecosystem frameworks, this study is grounded in institutional theory, which emphasizes the role of formal (regulatory, legal) and informal (normative, cultural) structures in shaping organizational behavior and innovation outcomes (Scott, 2001; North, 1990). Entrepreneurial success is influenced not only by resources but also by cultural, legal, historical, and economic factors within an industry. Institutional theory helps researchers analyze these broader contextual influences (Baumol, Litan, & Schramm, 2009). Coherently to institutional theory approach it has been implicated that governments can promote efficient market functioning by eliminating entry barriers, correcting market imperfections, and reducing overly restrictive regulations (Bruton, et al 2010). In transition economies such as those in the Western Balkans, institutional voids, fragmented governance, and weak rule enforcement often hinder technology transfer and entrepreneurship (Radosevic, 1999). These perspectives underscore the need for tailored policy interventions that align institutional structures with ecosystem-based innovation strategies.

'National Systems of Innovation' (NSI) literature was to debunk the linear model of innovation and emphasize and illustrate the interactive, iterative, and cumulative aspects of innovation processes in national contexts (; Lundvall, 1988; Lundvall et al., 2002).

This theoretical lens is especially relevant in the context of emerging economies, where the integration of diverse actors and the openness of the innovation process are often constrained by structural and institutional barriers. The open innovation paradigm emphasizes not only the absorptivity of organizational boundaries but also the necessity for absorptive capacities, enabling firms to recognize, assimilate, and apply external knowledge effectively (Zahra & George, 2002).

In the Quadruple Helix model (Carayannis & Campbell, 2009), innovation outcomes are co-created through collaboration between academia, industry, government, and civil society. This model highlights the importance of supportive policies, financial incentives, and efficient knowledge transfer channels as key determinants of innovation and entrepreneurship performance. The Quadruple Helix model offers an ideal framework for innovation governance, but its implementation in emerging economies is often hindered by institutional fragmentation, low trust among key actors, and limited civil society participation (Paliokaitė et al., 2015). While

the Quadruple Helix model (Carayannis & Campbell, 2009) presents an idealized form of innovation governance, its practical implementation in emerging economies faces constraints such as institutional silos, lack of trust among actors, and underdeveloped civil society involvement (Paliokaitė et al., 2015). This model presents a conceptual ideal rather than an easily replicable blueprint, as such, while the model provides a valuable lens for assessing innovation governance, its successful implementation requires overcoming deep-seated structural and cultural barriers, particularly in transitional ecosystems. These challenges limit the full realization of co-creation in widening countries like Macedonia, Serbia, Albania.

Contextual Relevance in Western Balkan transition economies

In transition economies, entrepreneurship and economic growth are often constrained by weak or absent institutional frameworks. Entrepreneurs are less likely to launch ventures when formal institutions are lacking or inadequate, and when informal alternatives fail to provide necessary support. As Bartels et al. (2012) emphasize, in developing and emerging economies, the coherence of National Innovation Systems is largely influenced by how effectively institutions support market transactions and inter-organizational coordination. This is particularly critical in transitional economies facing fragmented governance. Excessive bureaucracy, complex regulations, and high compliance costs further discourage entrepreneurial activity. Governments play a critical role in addressing these barriers by ensuring secure property rights, reducing unnecessary regulatory burdens, and fostering fair competition. As Broadman et al. (2004) observed, the absence of effective market-based institutions in Eastern Europe significantly impeded economic progress. Strengthening institutional quality is therefore essential for unlocking entrepreneurial potential in emerging markets. Transition economies face structural challenges such as limited R&D infrastructure, weak IP enforcement, and fragmented support networks. In this context, understanding how financial mechanisms, institutional barriers, and government interventions affect innovation becomes critical for policy and practice. This research fills an important gap by empirically testing these factors in the specific context of Serbia, Albania, Bosnia & Herzegovina, and North Macedonia. It builds on empirical insights from cross-country surveys and aligns with recent calls to adapt innovation policies to the needs of widening countries (Minutiello et al., 2024; Gracia-Laborda & Franco, 2023).

The Dynamics of Academia-Industry Collaboration within Open Innovation Frameworks

The dynamics of university-industry collaborations within open innovation ecosystems have attracted substantial academic attention. Recent literature highlights various determinants influencing these interactions, including institutional frameworks, governance structures, and individual motivations (Perkmann et al., 2007; Mahdad, Bogers & Piccaluga, 2019). Borah et al. (2023) argue that despite increased policy attention, the effectiveness of academia-industry collaborations remains variable, often undermined by misaligned incentives and inadequate communication channels. Their findings suggest a structured policy intervention, emphasizing institutional alignment and clearly defined mutual benefits as essential for effective collaboration.

Moreover, the establishment and role of dedicated intermediary entities, such as joint research centers and technology transfer offices (TTOs), are highlighted as critical factors for successful collaborations (Siegel, Veugelers & Wright, 2007). Siegel et al. (2007) emphasize the importance of enhancing the capabilities of technology transfer offices to manage intellectual property effectively, thus facilitating smoother transitions of innovations from academia to the commercial sector. Furthermore, in this respect Rothaermel et al. (2007) provide a conceptual framework that categorizes university entrepreneurship into four interrelated streams: the entrepreneurial research university, the productivity of technology transfer offices (TTOs), new firm creation, and the broader environmental context including innovation networks. This classification underscores the systemic and dynamic nature of university-driven innovation and helps contextualize the strategic role of TTOs in facilitating collaboration and commercialization. Although the literature highlights the strategic role of Technology Transfer Offices (TTOs) in supporting commercialization (Siegel et al., 2007), their actual development and operational capacity in Western Balkan countries remain limited. Many universities in the region lack fully functional TTOs or the necessary legal frameworks to manage IP rights effectively. As such, while TTOs are presented as ideal facilitators, future research and policy efforts must account for the foundational investments required to establish these institutions in transitional contexts.

Similarly, recent literature highlights joint university-industry research centers as successful models for promoting continuous interaction, trust-building, and mutual understanding, essential for sustainable innovation outcomes (Borah et al., 2023; Hughes & O'Regan, 2009).

Sustainable Entrepreneurship within Open Innovation Ecosystems

Sustainable entrepreneurship integrates economic activities with societal well-being and environmental sustainability, representing a critical pillar of open innovation ecosystems. Minutiello et al. (2024) stress that sustainable entrepreneurship is instrumental in achieving the United Nations' Sustainable Development Goals (SDGs), specifically within transitional economies. By embedding sustainability principles within entrepreneurial ventures, firms can leverage innovation not just for economic benefits but also for broader societal impact. Recent

studies further indicate that sustainability-oriented entrepreneurial initiatives thrive best in contexts characterized by strong institutional support, clear regulatory environments, and effective stakeholder engagement (Czerwińska-Lubszczyk, 2020).

Sustainable entrepreneurship in the Western Balkan transition economies is increasingly being shaped by open innovation ecosystems that integrate green growth priorities through Smart Specialisation Strategies and collaborative policy frameworks ([Green Transition and Smart Specialisation in the Western Balkans, 2024]; [Green Entrepreneurship Ecosystem Roadmap, 2022]). These developments are further supported by regional initiatives promoting social and green enterprise models, reinforcing the link between sustainability, innovation, and inclusive economic development ([Green Paper on Social Economy in the Western Balkans, 2023]; [The Color of Money, 2025])

Additionally, cultural factors significantly influence the practice of open innovation and sustainable entrepreneurship. Schneider (2016) argues that cultural dimensions profoundly affect entrepreneurial behaviors and collaborative practices. Understanding and adapting to local cultural contexts can, therefore, significantly enhance the effectiveness and acceptance of innovative and sustainable business models. This perspective highlights the critical importance of integrating cultural considerations into policy frameworks and entrepreneurial education to foster broader acceptance and participation in sustainable entrepreneurial initiatives.

Barriers and Enablers in Technology Transfer and Sustainable Entrepreneurship

It is widely recognized in the literature that entrepreneurs are shaped by their institutional environment, which can both restrict and facilitate their activities (Bruton & Ahlstrom, 2003; Scott, 2007). Numerous studies consistently identify various barriers that obstruct effective technology transfer and sustainable entrepreneurship within open innovation ecosystems. Bruneel and D'Este (2010) discuss barriers stemming from cognitive differences, institutional rigidity, and limited financial resources. Cognitive barriers include differences in organizational culture, objectives, and time horizons between academia and industry, often resulting in misunderstandings and ineffective collaborations. Institutional barriers include overly bureaucratic procedures within universities, restrictive intellectual property policies, and inadequate incentives for collaborative innovation. Cultural resistance, particularly the "not invented here" syndrome, remains a significant impediment to integration of external innovations. West and Bogers (2014) emphasize that firms with strong internal innovation legacies often face difficulties in assimilating externally sourced knowledge unless organizational culture and competencies are adapted accordingly.

Recent studies underscore the importance of addressing these barriers through targeted interventions. For example, Mahdad et al. (2019) suggest that enhancing communication, providing clear incentives, and developing integrated governance mechanisms significantly improve collaboration effectiveness. Similarly, Orazbayeva et al. (2020) highlight the motivational and cognitive factors influencing university-business cooperation, stressing the need for alignment of stakeholder goals and clearly defined roles. Their findings indicate that fostering an environment that encourages entrepreneurial mindsets among academics, while simultaneously building industry awareness and receptiveness to academic outputs, can significantly enhance collaboration outcomes.

Furthermore, Bruneel & D'Este (2010) emphasize building trust and enhancing absorptive capacities as critical facilitators for effective technology transfer and commercialization. Institutions should develop structured programs aimed at building relational capital and mutual understanding, thus facilitating smoother and more productive interactions between stakeholders. Additionally, policymakers are encouraged to design financial incentives and supportive regulatory frameworks that explicitly reward collaborative behaviors and innovation efforts.

HYPOTHESES DEVELOPMENT

Barriers to Technology Transfer (BTT)

Barriers to Technology Transfer (BTT) refer to institutional, cognitive, and resource-based obstacles that hinder effective knowledge exchange and innovation adoption. These include a limited skilled workforce, weak university–industry collaboration, fragmented networks, and inadequate funding mechanisms (Bruneel & D'Este, 2010; Orazbayeva et al., 2020; Pavlović et al., 2021).

Additionally, institutional rigidity and cognitive dissonance—manifested in mismatched expectations, priorities, and communication styles between academia and industry—constrain the development of absorptive capacity. Without the ability to recognize, assimilate, and apply external knowledge (Zahra & George, 2002), organizations face reduced readiness for technology transfer and limited potential for successful commercialization. As West and Bogers (2014) highlight, leveraging external sources of innovation involves not only acquisition but also integration, commercialization, and continuous interaction with external actors. Their four-phase model—comprising obtaining, integrating, commercializing, and interacting—provides a holistic framework for

understanding the nonlinear and collaborative nature of open innovation, especially relevant for transitional ecosystems that face structural rigidities.

These challenges resonate with the findings of Rothaermel et al. (2007), who highlight that effective commercialization of university-generated knowledge hinges on a combination of organizational structure, incentive systems, and the presence of intermediary institutions like science parks and incubators. Their analysis reveals that fragmented governance structures and weak alignment between academic goals and commercialization incentives remain persistent obstacles, especially in transitional economies

In widening countries such as Serbia, Albania, Bosnia & Herzegovina, and North Macedonia, these challenges are further exacerbated by weak innovation governance, underfunded public R&D systems, and a lack of policy coherence, which collectively diminish firms' engagement in open innovation ecosystems.

Based on these considerations, the following hypotheses are proposed:

H1a: Barriers to technology transfer limit internal innovation dynamics, lowering Technology Transfer Readiness.

H1b: These barriers also hinder the scaling and commercialization of innovations, reducing Commercialization Capability.

Financial Support Conditions (FSC)

Financial Support Conditions (FSC) refer to the availability and accessibility of funding from diverse sources—including private capital (e.g., venture capital, commercial banks), public funding (e.g., R&D grants, subsidies), and international donors. Such financial resources are widely recognized as a crucial enabler of both internal innovation investment and market-oriented scaling (De las Heras-Rosas et al., 2021; Czerwińska-Lubszczyk, 2020). Adequate financing supports organizations in developing infrastructure, investing in R&D, and fostering collaboration across institutional boundaries.

Moreover, robust financial support reduces uncertainty and risk, thereby enhancing organizations' ability to pursue commercialization pathways. In the context of emerging economies, where access to finance is often fragmented and uneven, financial support conditions can significantly shape an organization's innovation trajectory.

- **H2a:** Strong financial support increases Technology Transfer Readiness by enabling internal investment.
- **H2b:** Financial support enhances Commercialization Capability by reducing risk and increasing market entry potential.

Government Incentives (GI)

Government Incentives (GI) play a crucial role in fostering open innovation ecosystems by creating enabling conditions for collaboration, knowledge transfer, and commercialization. These incentives include legal and regulatory reforms, intellectual property (IP) protections, public-private partnership programs, and financial subsidies (Siegel et al., 2007; Pavlović et al., 2021; Qejvani & Gjipali, 2024).

When well-designed and aligned with stakeholders' needs, such instruments help reduce transaction costs, increase trust among actors, and facilitate the flow of innovations into the market. In the context of widening countries like Serbia, Albania, Bosnia & Herzegovina, and North Macedonia, government incentives are often underutilized due to fragmented governance structures and inconsistent implementation, yet they remain a potentially powerful expedient for ecosystem development.

Accordingly, this study proposes the following hypotheses:

- **H3a:** Supportive government incentives foster partnerships and institutional alignment, boosting Technology Transfer Readiness.
- **H3b:** Government incentives directly enhance Commercialization Capability by streamlining legal and financial processes and incentivizing innovation.

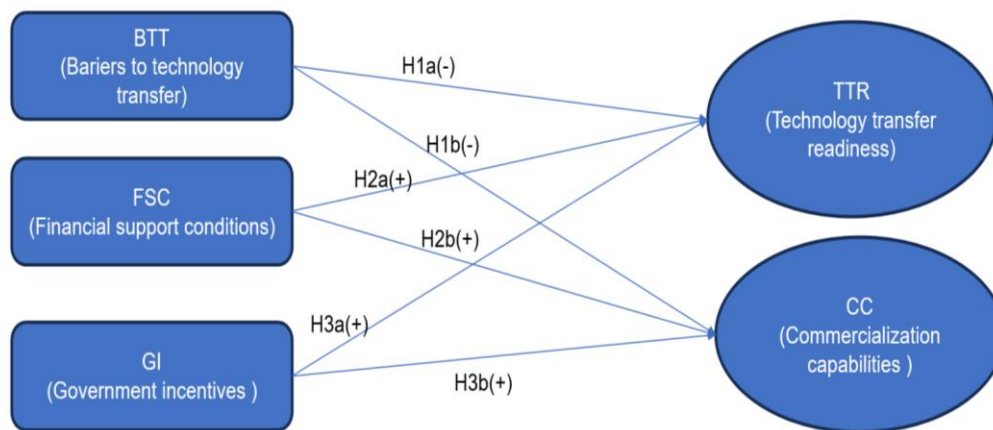
Financial Support Conditions (FSC) vs. Government Incentives (GI)

It is important to distinguish Financial Support Conditions (FSC) from Government Incentives (GI). While FSC represents the availability and accessibility of financial capital across both private and public sources, GI is explicitly state-initiated and strategically designed to support innovation ecosystems through targeted programs, regulatory facilitation, and public-private partnerships. These two constructs, although interrelated, have distinct policy implications.

Table.1

Construct	Hypothesis	Outcome	Direction	Relationship Description
Barriers to Tech Transfer (BTT)	H1a	Technology Transfer Readiness	Negative (-)	Hinders internal innovation, reduces readiness
	H1b	Commercialization Capability	Negative (-)	Impedes scaling and innovation uptake
Financial Support Conditions	H2a	Technology Transfer Readiness	Positive (+)	Enables R&D and innovation investment
	H2b	Commercialization Capability	Positive (+)	Reduces risk and facilitates market access
Government Incentives (GI)	H3a	Technology Transfer Readiness	Positive (+)	Strengthens collaboration and institutional alignment
	H3b	Commercialization Capability	Positive (+)	Supports smoother innovation commercialization

Empirical research model



Dependent Variables in the Model

•TTR = Technology Transfer Readiness

The extent to which organizations are internally prepared to engage in open innovation and technology transfer processes (e.g., innovation culture, leadership, technological infrastructure).

Refers to an organization's internal preparedness to engage in open innovation. It includes its culture, leadership, partnerships, and infrastructure. The literature shows that institutional readiness is a prerequisite for absorbing, adapting, and applying external knowledge (Perkmann et al., 2007; Mahdad et al., 2019; Borah et al., 2023).

• CC = Commercialization Capability

The extent to which organizations possess the ability to bring innovations to market (e.g., product adaptation, IP protection, market access). Captures the ability of organizations to translate research and development into viable products or services. This is closely linked to market access, intellectual property management, and startup support systems (Siegel et al., 2007; Minutiello et al., 2024; Gracia-Laborda & Franco, 2023).

Independent Variables in the Model

• BTT = Barriers to Technology Transfer

Challenges such as lack of skilled workforce, weak university-industry collaboration, and limited funding that hinder knowledge flow and innovation adoption.

• **FSC = Financial Support Conditions**

The availability and accessibility of financial resources such as grants, venture capital, tax incentives, and subsidies that support innovative activities.

• **GI = Government Incentives**

Policy tools such as R&D tax credits, commercialization subsidies, and regulatory support mechanisms that stimulate collaboration and innovation.

METHODOLOGY

The model follows a logic where barriers constrain, and support mechanisms enable innovation. Institutional voids—manifested as barriers to tech transfer—are posited to negatively influence both readiness and commercialization. In contrast, financial and governmental enablers are hypothesized to enhance internal preparedness (TTR) and external market reach (CC). This dual-path framework is tested using structural equation modeling across four countries.

Research Design

This study adopts a quantitative, cross-sectional design to empirically examine the relationships between institutional barriers, financial and policy conditions, and organizational outcomes related to technology transfer and commercialization. The research is situated within the context of emerging open innovation ecosystems in four widening countries: Serbia, Albania, Bosnia & Herzegovina, and North Macedonia.

Data Collection

Data was collected through a structured questionnaire distributed to experts and managers from over 100 companies operating in innovation-oriented sectors. The respondents included representatives from industry, research institutions, and intermediary organizations with experience in technology transfer and entrepreneurship development. The survey was conducted online between [insert months/year].

The questionnaire was developed based on prior literature and validated instruments related to open innovation, sustainable entrepreneurship, and innovation policy. All items were rated on a 5-point Likert scale (1 = Completely Insignificant, 5 = Very Significant).

Measurement of Constructs

In the proposed model, BTT is conceptualized as a negative construct that must be mitigated, whereas FSC and GI are viewed as positive enablers that facilitate innovation and reduce systemic risk. Among the dependent variables, Technology Transfer Readiness (TTR) reflects an internal organizational enabler, while Commercialization Capability (CC) denotes an externally facing outcome connected to market performance.

- Technology Transfer Readiness (TTR): Measured by four items capturing internal innovation culture, infrastructure, leadership support, and strategic partnerships.
- Commercialization Capability (CC): Measured by five items focusing on IP protection, product-market fit, industrial collaboration, and startup support.
- Barriers to Technology Transfer (BTT): Measured by three items reflecting institutional and workforce constraints.
- Financial Support Conditions (FSC): Measured by five items including grants, investment opportunities, tax incentives, and return on innovation.
- Government Incentives (GI): Measured by four items related to policy instruments for research, IP regulation, and commercialization subsidies.

Data Analysis

The analysis is conducted in two stages:

1. Exploratory Factor Analysis (EFA) in SPSS is used to validate the dimensionality and internal consistency of the constructs. Cronbach's alpha values above 0.70 are used to confirm reliability.
2. Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS is employed to test the hypothesized relationships. Path coefficients, R^2 values, and bootstrapped t-values are reported to assess model fit and significance.

EXPECTED RESULTS AND DISCUSSION

The following discussion integrates both empirical expectations based on the structural model and broader interpretive insights derived from literature and policy analysis. While the empirical model focuses on quantifying the effects of institutional and financial variables, some policy recommendations emerging from this study are interpretive and based on theoretical and contextual inference.

The expected results of this study are grounded in the assumption that institutional, financial, and policy-related factors exert significant influence on organizational readiness and capability within emerging open innovative ecosystems. It is anticipated that barriers to technology transfer—such as weak university-industry linkages, limited financial resources, and lack of skilled human capital—will negatively affect both the ability of organizations to absorb external knowledge (Technology Transfer Readiness) and their capacity to commercialize innovations (Commercialization Capability).

In contrast, it is expected that organizations with access to diverse and adequate financial support mechanisms, including grants, venture capital, and tax incentives, will report higher levels of both readiness and commercialization capability. Financial support conditions are likely to facilitate the internal development of innovation structures while also reducing market entry risks.

Furthermore, the study anticipates that government incentives, particularly those that encourage research-industry collaboration and support intellectual property protection, will be positively associated with technology transfer readiness. These incentives may also contribute to commercialization outcomes, though the effect may be slightly less direct compared to financial conditions.

Although many firms focus on acquiring external innovations, the phases of integration and commercialization are often under-researched and poorly operationalized. As West and Bogers (2014) note, a significant research gap remains in understanding how externally sourced innovations are successfully commercialized, particularly in firms operating within constrained ecosystems such as those in the Western Balkans.

The findings are expected to align with prior research in the field of open innovation and entrepreneurship in transitional contexts. In particular, the study will likely reaffirm the critical role of financial mechanisms and government policy in shaping innovation dynamics in emerging economies (Siegel et al., 2007; Orazbayeva et al., 2020; Minutiello et al., 2024).

The negative influence of barriers may confirm earlier studies emphasizing institutional rigidity, weak university-industry collaboration, and lack of innovation culture as key bottlenecks (Bruneel & D'Este, 2010). These results could offer practical justification for developing tailored innovation policies in widening countries, where structural weaknesses require targeted capacity-building interventions.

The dual focus on both internal readiness (TTR) and external capability (CC) enables a more nuanced understanding of where innovation ecosystems break down—and where they can be strengthened. Moreover, the inclusion of multiple countries allows for cross-regional insights that can inform regional development policies, especially under EU-supported programs aimed at convergence and innovation capacity-building.

Cultural norms—such as hierarchy, risk aversion, or perceptions of state-business collaboration—can significantly shape the outcomes of open innovation efforts (Schneider, 2016). While this study does not explicitly model cultural variation, future research should explore how cultural congruence moderates the effectiveness of institutional incentives.

Contributions and Policy Implications:

This study provides actionable insights for regional policymakers and innovation stakeholders. By identifying key levers such as financial mechanisms and strategic government support, the findings can inform EU policy for innovation convergence and smart specialization. Moreover, the model's emphasis on institutional alignment and absorptive capacity development contributes to the broader literature on entrepreneurial ecosystems in transitional economies.

CONCLUSION AND FUTURE RESEARCH

This research-in-progress study aims to deepen the understanding of the institutional and policy-related drivers that shape technology transfer and sustainable entrepreneurship within emerging open innovation ecosystems. The proposed empirical model sheds light on how barriers, financial support conditions, and government incentives affect organizational readiness and commercialization outcomes in widening countries.

By empirically validating these relationships, the study is expected to contribute to both academic literature and policy development. It highlights the importance of designing innovation strategies that reduce systemic barriers, expand access to finance, and strengthen public support mechanisms. The cross-country perspective further enhances the applicability of findings for regional innovation policies and EU-supported development frameworks. Future work will include full model estimation, comparative analysis across country contexts, and the development of tailored recommendations to support innovation capacity building in transitional economies.

Future research should further explore how the four interlinked domains outlined by Rothaermel et al. (2007)—entrepreneurial university orientation, TTO productivity, new firm creation, and networked environments—manifest in the widening countries. Understanding the interplay of these elements can provide a roadmap for strengthening university-driven innovation systems and addressing institutional fragmentation.

Although the importance of cultural norms and values is recognized in shaping entrepreneurial behavior and innovation adoption (Schneider, 2016), these factors are not explicitly included in the empirical model of this study. Future research should consider incorporating cultural dimensions as potential moderating variables, particularly given the socio-cultural diversity of the Western Balkan countries. Doing so could offer a more nuanced understanding of the contextual enablers and barriers to sustainable entrepreneurship.

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EVALUATING SOFT SKILLS APPROACHES FOR STRENGTHENING YOUTH ENTREPRENEURSHIP

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Abstract:

The article is based on research that aims to identify the most essential soft skills for entrepreneurial success in the Western Balkan region and to identify educational and work practices, that are effective for enhancing soft skills and for fostering the entrepreneurial competencies of young people. The research employs a qualitative research design, based on a Delphi study, to achieve consensus on soft skills' importance for enterprise success. The study involved 20 experts, with 5 participants representing each Western Balkan country: Serbia, Albania, North Macedonia, and Bosnia and Herzegovina. The analysis of experts' responses, based on frequency distribution, was used to calculate consensus and identify common viewpoints. The Delphi study results highlight communication skills, adaptability and flexibility, teamwork and collaboration, and critical thinking as essential soft skills for modern business conditions. Experts find leadership, communication, emotional intelligence, problem-solving, and teamwork crucial for future entrepreneurs. They indicated that group projects, specialized courses, training programs, and a combination of traditional classroom learning and training programs are effective methods for developing soft skills in an educational context. In the case of the workplace, experts agree that specialized courses and training programs, one-on-one or group mentoring, active communication with employees, and openness to feedback are valuable tools for developing employees' soft skills. The study underscores the critical need for integrating soft skills into educational and workplace training programs in the Western Balkans to foster entrepreneurial success.

Keywords: entrepreneurship, youth, soft skills, Delphi study, Western Balkan.

INTRODUCTION

Entrepreneurship is an important factor in every country's development. It is significant for industrial development, regional growth, creating new businesses, and employment generation (Selvan & Vivek, 2020). However, youth entrepreneurship has specific importance. As young people are generally innovative, risk-orientated, and flexible, they have new and fresh perspectives, which can add value to society in many different ways. In addition, by establishing new businesses, young entrepreneurs can create job opportunities for themselves and others, increasing overall employment in the country (Udo & Udom, 2023). It is also important to mention that successful young entrepreneurs can serve as role models for other young people (Bosma, 2011) and as a viable self-employment alternative. This is especially important when it is difficult to find satisfactory wage-based employment after completing the studies (Kamau-Maina, 2006).

However, the creation of a new business is a challenging task. During the establishment and running of the business, the entrepreneurs face many risks and unpredictable situations that require adequate competence. The necessary parts of the competencies are technical or hard skills, which they acquire during the process of education (Cambronero Alonso, 2021), training, or practice, but they are not enough. They should be complemented with equally important skills called soft skills.

Although hard skills are integral components of an individual's educational background and are usually seen as a key requirement during the employment process (Alonso, 2021), in contemporary business, especially in entrepreneurship, they should be complemented by soft skills such as communication, adaptability, teamwork, etc. (Alonso, 2021).

In the literature, however, there is no agreement on the precise definition of soft skills. They are generally described as a collection of competencies, behaviours, attitudes, personal qualities, motivations, and thought processes (Youth Business International 2018). Over time, the definition of soft skills has expanded to include skills such as time management, delegation, conflict resolution, stress management, resilience, curiosity, risk-taking, adaptability, and creativity or innovation (Youth Business International 2019). Nevertheless, of their imprecise definitions, there is no doubt that these skills can significantly empower young individuals to achieve their goals, collaborate effectively with others, and navigate their careers.

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Soft skills generally possess several characteristics that distinguish them from hard skills. Chaudhari (2021) identified several such characteristics. This author noted that soft skills are behavioural, general, trans-situational, non-technical, and intangible (Chaudhari, 2021). The soft skills are *general*, as they can be applied in various contexts. In other words, they have universal application. Chaudhari (2021) further states that soft skills are *trans-situational*, meaning that they are realistic in any situation. This author also says that “whatever is the situation bad, good or worst soft skills will help to negotiate situation and it will keep it moving” (Chaudhari, 2021, p. 11). Soft skills are *non-technical*, as they have simple logic shadowed by one's own consent. Finally, soft skills are *intangible* in nature and therefore cannot be easily observed or measured. In fact, they shape the personalities of individuals.

The assumption underlying this work is that soft skills can be developed in the workplace, but also during the education process. In general, soft skills are identified as the most critical skills in current global job market, particularly in the area of entrepreneurship, which is in a rapidly moving era of technology (Jain, 2009), but they are also important for young people to facilitate their successful integration into the workforce when seeking employment or starting their own business. Therefore, the second assumption is that the same soft skills are equally important for successful running business and for successful integration into the workplace.

As such, the specific research goals include:

1. Identifying reasons and factors for the development of soft skills.
2. Identifying methods for recognising/assessing soft skills.

Based on the above, the paper is structured into two main parts. The first part presents a review of relevant literature on soft skills identified as essential for enterprise success. The second part analyses research conducted in the conducted in the countries of the Western Balkans.

LITERATURE REVIEW

Approaches to developing and strengthening soft skills in education and the workplace

Soft skills development can occur through both educational and workplace contexts. While educational approaches are well established (Lavi et al., 2021), workplace methods remain less clearly defined. Given the sporadic nature of educational programs, enhanced collaboration among educational institutions, employers, and policymakers may improve outcomes (Cacciolatti et al., 2017). Through formal, informal, and nonformal activities, educational institutions cultivate soft skills. According to Cinque (2016), there are four primary categories: experiential learning, officially recognized hall-based courses, authorized university courses, and non-sanctioned hall activities. These many approaches promote skill development, particularly in residential settings. Institutions are crucial in promoting teamwork, communication, leadership, critical thinking, and creativity through experiential, e-learning, and active learning approaches (Polakova et al., 2023).

It has been demonstrated that a variety of teaching strategies aid in the development of soft skills, with active strategies outperforming passive ones by a large margin (Lavi et al., 2021). Project-based learning, research assignments, and lab work are among strategies that encourage student engagement and introspection, which is crucial for developing abilities like communication and teamwork (Lavi et al., 2021). Through group cooperation, reflective feedback, and real-world activities, experiential learning, in particular, improves entrepreneurial soft skills.

Given that graduates frequently leave school without sufficient capabilities, workplace experience is crucial for improving soft skills (Wilson et al., 2012). Effective strategies for cultivating abilities like communication, leadership, and cooperation in practical contexts include mentorship, teamwork-based projects, feedback systems, on-the-job training, and cultural awareness initiatives (Cimatti, 2016).

Particularly in the areas of communication, leadership, critical thinking, and problem-solving – skills essential for employability – academic training frequently falls short of labor market standards (Cacciolatti et al., 2017; Wilson et al., 2012). Critical thinking, interpersonal communication, and teamwork are valued by employers (Cacciolatti et al., 2017). These competences are successfully developed through academic-industry collaborations, including lab work, joint projects, and internships (Cimatti, 2016). Both academic and corporate environments can foster the development of soft skills through guided (workshops, case studies), expository (lectures, mentoring), and active (visits, coaching, role play) approaches (Cinque, 2016).

Key personality traits for successful development of soft skills

Although personality traits and soft skills are two different ideas, they are frequently mentioned in connection with individual performance. Personality traits are innate, comparatively constant qualities that set people apart. These characteristics include conscientiousness, agreeableness, openness, extraversion, emotional stability, and conscientiousness, according to the Big Five Model. It is more difficult to alter these characteristics by training or outside intervention because they are usually resistant to influence and change (Fantozzi et al., 2024).

Soft skills, on the other hand, are interpersonal and behavioral abilities unrelated to technical proficiency. These include skills that may be improved and developed over time, like teamwork, communication, leadership, and flexibility. Soft skills are context-dependent and flexible, in contrast to personality traits. Employer demands have changed, which is reflected in the increased emphasis on soft skills, particularly since the 2010s (Fantozzi et al., 2024).

There is also an opinion that soft skills – also referred to as personality traits, noncognitive skills, character, or socioemotional skills – are personal attributes that influence behavior, motivations, goals, and preferences. These traits are distinct from cognitive abilities like IQ and are stable over time, although they can also be changed through life experiences and interventions (Heckman, & Kautz, 2012).

Regarding relation between soft skills and personality traits, Heckman and Kautz (2012) highlight those soft skills are essentially manifestations of underlying personality traits. These traits are biologically rooted and tend to be consistent across different situations, influencing how individuals behave, respond to incentives, and pursue various life tasks. They also note that many of these traits, such as conscientiousness, perseverance, and curiosity, are predictive of important life outcomes, including educational attainment, labor market success, and health.

The successful development of soft skills is closely linked to certain personality traits that serve as essential prerequisites. Traits such as openness to learning facilitate the continuous acquisition and refinement of new skills, fostering growth-oriented behavior critical for adapting to dynamic work environments (Chamorro-Premuzic, & Furnham, 2009). Empathy enhances interpersonal understanding and collaboration, forming the basis for effective teamwork and conflict resolution (Ratka, 2018). Strong communication skills, encompassing both verbal and non-verbal dimensions, are fundamental for expressing ideas, building relationships, and enabling other soft skills to flourish. Adaptability allows individuals to respond constructively to change, a key attribute in fast-evolving professional contexts (Nejad et al., 2021). Finally, self-awareness supports the regulation of behavior and emotional responses, enabling individuals to recognize personal strengths and areas for improvement, which is vital for intentional soft skills development (Showry, & Manasa, 2014). Together, these traits create a foundation upon which soft skills can be effectively cultivated and applied.

Key soft skills for starting and successfully running a business

Exploring soft skills is important for start-up creation and entrepreneurial growth. Entrepreneurs must continuously grow their interpersonal skills, known as soft management skills, to gain a competitive advantage. These skills are crucial for success in today's global, information-based economy. Empirical evidence suggests that soft skills distinguish between entrepreneurial success and failure (Holmberg-Wright & Hribar, 2016). Soft management skills are interpersonal aspects of leadership and management, often overlooked in mainstream education systems or the workplace (Holmberg-Wright & Hribar, 2016; Yashin, Bagirova, & Klyuev, 2018). Moreover, entrepreneurs often find the *people stuff* more emotionally demanding and challenging than selling products or services (Hees, 2012). Nevertheless, these skills enable entrepreneurs to become leaders, motivate employees, utilize human potential effectively, and deal with customers. For example, communication is a soft skill essential for effectively using all other skills (Holmberg-Wright & Hribar, 2016). Without clear communication, decisions are meaningless. Entrepreneurs must explain, discuss, sell, market, and engage with their team.

Effective soft skills distinguish effectiveness and success in managing people, making them an essential component of leadership and success. Researching serial entrepreneurs, Bonnstetter (2012) identified persuasion, leadership, personal accountability, goal orientation, and interpersonal skills as five soft skills areas where entrepreneurs excelled. Similarly, Almeida and Devedžić (2022) find that soft skills are essential for entrepreneurs, with emotional intelligence, resilience, and persistence being important attributes to have. Simba et al. (2024) show that soft skills are crucial for novice entrepreneurs' readiness. They find that a wide set of the so-called soft skills, including leadership, creative and critical thinking, emotional learning, communication, empathy, collaboration, adaptability, self-confidence, and cultural awareness, positively affect the venture creation, financing, and growth. To overcome challenges and achieve organizational excellence, new entrepreneurs must develop and practice a set of soft skills, including the ability to communicate, understand, motivate, and lead (Tripathy, 2019). As the

entrepreneurial venture grows, entrepreneurs must transition to delegation and managing the managers, which involves evolving into leaders (Hees, 2012; Holbmerg-Wright & Hribar, 2016). This requires learning new skills and becoming more emotionally intelligent. Many entrepreneurs fail as leaders due to this emotional, people-focused management, which is why many must step aside to continue growing their businesses. This emotional management is crucial for entrepreneurs to succeed in their business (Hees, 2012).

Essential soft skills for standing out in the HRM selection process

In the modern business environment, in addition to technical qualifications and professional competencies, so-called soft skills are gaining increasing importance in the candidate selection process. Human resource management departments are progressively recognizing these abilities as key indicators of a candidate's potential to successfully integrate into the organizational culture, collaborate effectively within teams, and achieve long-term professional development. Based on this, the following section identifies and analyzes the most relevant soft skills that contribute to a positive evaluation of candidates during recruitment.

Employers have frequently identified shortcomings in soft skills as a major concern (Baum, 2002; Hurrell, 2009). These issues are most often observed among current employees, though skill gaps are also present among prospective hires. Studies indicate that between 16% and 25% of employers report deficiencies in soft skills among their workforce, particularly in areas such as verbal communication, customer handling, and teamwork (Hurrell, 2009).

Similarly, research by Green et al (2001) indicates the importance of the following soft skills: problem-solving, communication, social, and teamwork skills. Engelberg (2015) pointed out that communication, listening skills, negotiation, networking, problem solving, decision making and assertiveness (Engelberg 2015) represent the main social skills, while soft skills go beyond the strict requirements of the profession (Grisi, 2014).

In addition to communication and teamwork, employers increasingly emphasize other soft skills that significantly enhance individual employability and long-term workplace effectiveness. One such competency is emotional intelligence, which encompasses self-awareness, self-regulation, empathy and social skills. Goleman (1998) argues that emotional intelligence is often a stronger predictor of workplace success than traditional cognitive intelligence, especially in roles that require interpersonal interaction and leadership. Numerous studies have since confirmed that emotional intelligence plays a key role in conflict resolution, leadership effectiveness and organizational citizenship behavior (Côté & Miners, 2006; Ronald, 2016; Kornienko & Barchi, 2023).

Adaptability and flexibility have also become essential, particularly as organizations face rapid technological advancements and changing market demands. As noted by Pulakos et al. (2000), adaptive performance defined as the ability to effectively adjust to changes, is increasingly viewed as a core job requirement across all industries. Employees who demonstrate agility in responding to new challenges or shifts in responsibilities are considered valuable assets to their organizations (Puad et al., 2024).

Another critical soft skill is problem-solving, which refers to an individual's ability to analyze situations, identify issues and apply effective solutions. According to Robles (2012), problem-solving ranks among the top ten soft skills sought by employers, as it directly impacts organizational efficiency and innovation. This competency is particularly important in complex, dynamic work environments that often require independent decision-making. Similar conclusions are drawn in studies by other authors (Mathew et al., 2019; Bariyyah, 2021; Araiza-Alba et al., 2021).

Critical thinking, closely related to problem-solving, involves the objective analysis and evaluation of information to form a reasoned judgment. The World Economic Forum (2020) ranks critical thinking among the most important skills for the future of work. Employers value candidates who can logically assess situations, evaluate alternatives and make informed decisions, particularly in data-rich or strategic roles.

Moreover, time management and self-motivation are increasingly recognized as essential in hybrid and remote work environments. These skills reflect an individual's ability to prioritize tasks, maintain productivity independently, and meet deadlines without direct supervision. According to a study conducted by LinkedIn Learning (2021), time management is cited as one of the most lacking yet most desirable soft skills among modern professionals.

Finally, intercultural competence, the ability to work effectively in diverse, global teams, is gaining importance as organizations become increasingly international in scope. Deardorff (2006) emphasizes that intercultural awareness not only improves communication but also supports more inclusive and innovative work environments.

On the other hand, research by Prigozhina (2019) highlights the particular significance of this competence in international negotiations.

RESEARCH RESULTS

The study utilizes a qualitative research approach, specifically the Delphi method, to establish a consensus on the reasons and factors for the development of soft skills, as well as the methods for recognising/assessing soft skills. This method is used to develop different alternatives, to explore or discover underlying assumptions, and to obtain consensus among domain experts on a topic. It enables anonymity, which encourages creativity, honesty and balanced consideration of ideas by experts. On the other hand, it increases the existing knowledge of experts in the field of research through feedback given during iterations.

In this Delphi study 20 experts participated, with five representatives from each of the Western Balkan countries: Serbia, Albania, North Macedonia, and Bosnia and Herzegovina. The criteria for experts' selection included the following: at least higher education, managerial position in the organization, at least five years of work experience in general and at least two years of experience HR field, or at least 3 years of experience in running one's own business. The research instrument was the Questionnaire for experts, mostly composed of open-ended questions. Yes/No questions were focused on importance of soft skill in modern conditions and possibilities for their assessment. Open-ended questions included the ones that we dealing with types of soft skills and the ways of their development. After the first round, all answers were collected and the ones with the highest frequency of appearance used as a starting point for the second round. For the second round the questionnaire with 5 mostly mentioned answers for each question was distributed to the same experts with the aim of reaching agreement on the key soft skills needed either for starting one's own business, or for a positive evaluation by the HRM department in the selection process. Further analysis was based on 5-point Likert scale and statistical analysis of the data collected. If more than 70% of the experts rated the offered answer as significant or very significant, it is considered that a consensus has been reached.

Therefore, the experts' opinion was analysed by using frequency distribution to assess the level of agreement and to highlight shared perspectives. The outcomes of the Delphi process revealed a unanimous agreement among experts that soft skills cannot be overlooked in today's business environment. Furthermore, they concurred that, for certain roles, soft skills are even more critical than technical or hard skills.

The most of experts (70%) confirmed that it is difficult to assess/recognize an individual's soft skills. As possible ways for their assessment, experts mostly emphasized: psychological tests, interviewing, observation in team activities, reference checks, and detailed observation of communication and behaviour. For other questions, the most frequent answers concerning other research questions are presented in Table 0

Table 0: Delphi study – answers systematized based on the first round of interviews

Questions
1. Is it possible to ignore soft skills in modern business conditions? * 100% No
2. Is the presence of soft skills more important than hard skills for some jobs?* 100% Yes
2a. If yes, what are the jobs? (set only if the expert said YES) Human resources Leadership and management Customer service Marketing CEO
3. What are the soft skills of individuals desirable in modern business conditions? Communication skills Adaptability and flexibility Emotional intelligence Teamwork and collaboration Critical thinking
4. What are the reasons for developing soft skills in the workplace? Building strong relationships

Contribute to teamwork Motivate the staff Opportunity for personal development Conflict resolution
5. According to your opinion and experience, how should the activities of building and strengthening soft skills be approached in the formal education system, and how in the workplace? Interview Special courses and training programs Encourage group projects and workshops Combination of typical classroom learning/training programs Assertive communication
6. What are the necessary prerequisites (personality traits) for the successful development of soft skills of individuals? Openness to learning Empathy Communication Skills Adaptability Self-awareness
7. What soft skills would you identify as key to starting and successfully running your own business? Leadership skills Communication skills Emotional intelligence Problem-solving skills Teamwork
8. Which soft skills would you identify as key for positive evaluation by the HRM service in the selection process? Communication skills Teamwork Adaptability and flexibility Emotional Intelligence Problem-solving skills
9. Based on your experience, is it difficult to assess/recognize an individual's soft skills?* 70% Yes, 30% No
9a. In what way is it possible to assess/recognize the soft skills of individuals? Psychological tests Interviewing Observation in team activities Reference checks Detailed observation of communication and behaviour

Source: Authors' presentation.

Based on collected responses and their analysis, it is evident that the respondents recognize the significant importance of developing soft skills in the workplace. The most commonly mentioned reasons for their development include building strong interpersonal relationships, encouraging teamwork, and resolving conflicts, which indicates a high level of awareness regarding their practical application in everyday business settings.

When it comes to approaches to developing soft skills, the respondents emphasized a combination of formal education and practical training as the most effective. Activities such as group projects, workshops, interviews, and assertive communication were particularly highlighted, suggesting the importance of interactive learning and real-life engagement in the development process. While educational approaches to developing soft skills are well established (Lavi et al., 2021), their importance is equally emphasized in the workplace, where skills such as teamwork, communication, leadership, critical thinking, and creativity are promoted through experiential, e-learning, and active learning methods (Polakova et al., 2023).

As for the necessary prerequisites for the successful development of soft skills, openness to learning, empathy, and adaptability were most frequently mentioned. These traits enable individuals to integrate more easily into

teams and actively pursue personal growth. This is consistent with previous research confirming the importance of personal traits (Fantozzi et al., 2024).

Special attention was given to the importance of soft skills in both entrepreneurship and recruitment. Leadership abilities, emotional intelligence, and problem-solving were identified as essential for starting and running a successful business, as well as key criteria evaluated by HRM services during the selection process. The research results are consistent with existing studies (Araiza-Alba et al., 2021; Korniienko & Barchi, 2023; Puad et al., 2024).

Although the majority of respondents believe that assessing soft skills is challenging (70%), effective methods such as interviews, psychological testing, observation during team activities, and detailed monitoring of communication and behaviour were mentioned. This indicates an awareness of the need for a systematic approach to identifying and evaluating soft skills in professional settings.

CONCLUSION

The findings of this study confirm the growing recognition of soft skills as a crucial component of individual and organizational success. Whether in the context of teamwork, leadership, conflict resolution, or adaptability, soft skills significantly influence workplace dynamics and outcomes.

Both educational institutions and professional environments play a fundamental role in fostering these competencies. The integration of interactive learning methods, specialized training programs, and real-life engagement has proven essential for their effective development. Moreover, personality traits such as empathy, openness to learning, and self-awareness serve as important foundations upon which soft skills can be cultivated and enhanced.

The Delphi study conducted within this research, clearly highlights communication skills, adaptability and flexibility, teamwork, and critical thinking as essential for modern business conditions in the Western Balkans. Furthermore, leadership, emotional intelligence, and problem-solving skills were emphasized as especially important for entrepreneurial success among young people.

The experts also provided valuable insights into the most effective methods for soft skills development. In educational contexts, group projects, specialized courses, training programs, and the combination of traditional and interactive approaches were considered most impactful. In the workplace, mentoring (both individual and group), active communication with employees, specialized training, and openness to feedback were recognized as key strategies for enhancing employees' soft skills.

In light of presented findings, the study underscores the critical need for systematically integrating soft skills into both formal education and professional training programs across the Western Balkan region. Such integration is not only necessary to meet the evolving demands of the labour market, but is also vital for fostering entrepreneurial competencies and long-term economic development. Further research should involve greater number of managers and entrepreneurs for validating the conclusions of the Delphi study, but also mapping the techniques and tools for developing soft skills necessary for doing business in modern conditions.

ACKNOWLEDGEMENT

This research is part of the 101120390 - USE IPM - HORIZON-WIDERA-2022-TALENTS-03-01 project, funded by the European Union. Views and opinions expressed are however those of the authors only and do not necessarily reflect those of the European Union or the European Research Executive Agency. Neither the European Union nor the European Research Executive Agency can be held responsible for them

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ACKNOWLEDGEMENT

This research is part of the 101120390 - USE IPM - HORIZON-WIDERA-2022-TALENTS-03-01 project, funded by the European Union. Views and opinions expressed are however those of the authors only and do not necessarily reflect those of the European Union or the European Research Executive Agency. Neither the European Union nor the European Research Executive Agency can be held responsible for them

THE ROLE OF EXTERNAL SUPPORT IN THE DEVELOPMENT OF GREEN PRODUCTS AND SERVICES IN SMALL AND MEDIUM-SIZED ENTERPRISES IN EUROPEAN COUNTRIES

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Abstract:

Small and medium-sized enterprises (SMEs) form the backbone of the European economy, yet they also have a significant cumulative impact on the environment. To encourage their green transformation, the European Commission implements policies and strategies such as the 2030 Agenda, the Green Deal, and the SME Strategy. However, numerous practical barriers hinder the implementation of these measures, making various forms of external support crucial for the success of the green transition of SMEs. The aim of this paper was to identify the types of support that have the greatest impact on SMEs' decisions to introduce green products and to propose measures for improving these support mechanisms in the future. Using a sample of 12,657 SMEs from 37 European countries, different forms of support were analyzed, including support from public administrations, consulting firms, supply chain partners, business associations, clusters, and family. Factor analysis revealed that public administration, private consulting companies, and supply chain partners have the most significant influence on the adoption of green products, while the influence of business associations, clusters, and family support is somewhat smaller. To account for differences among countries in the level of green market development, cluster analysis was applied. Based on the results, countries were grouped into three clusters. Cluster 1, comprising countries with the most developed green markets, features SMEs with good access to institutional financing, well-developed financial mechanisms, and a high level of awareness. Cluster 2 includes countries with moderately developed green economies, where the institutional environment is still maturing, and business associations and clusters play a significant role, though access to public funding is limited. Cluster 3 consists of countries with the least developed green markets, characterized by low awareness and limited institutional capacity to support the green transformation of SMEs. The research results provide a better understanding of the diverse institutional environments in which SMEs operate and can contribute to the formulation of targeted policies to promote green innovation and sustainable growth.

Keywords: SMEs, green innovations, green products, external support, green transformation of SMEs.

INTRODUCTION

In a dynamic environment, responsible behavior and sustainable development are becoming key strategic imperatives for every enterprise (Durmanov et al., 2019). Companies are expected to adopt and integrate business practices that involve a responsible approach to the environment while simultaneously improving their economic performance. Enterprises are also expected to innovate their processes in order to reduce the use of natural resources and energy, lower CO₂ emissions, decrease waste generation, and mitigate negative impacts on human health and ecosystems (Ivanović-Đukić et al., 2025).

Sustainable development of enterprises requires the implementation of green innovations that simultaneously contribute to generating profit, preserving the natural environment, and improving the well-being of society. However, the introduction of green innovations necessitates changes to business models, investments in research and development, skilled personnel, and financial support. Given that SMEs have limited resources, they often face numerous barriers on their path toward green transformation and the adoption of green innovations. For this reason, external support can play a very important role. External support in the form of government subsidies, tax incentives, innovation funds, advisory programs, and collaboration with academia and non-governmental organizations can be crucial in influencing the decisions of SME entrepreneurs and managers to implement green innovations. Consequently, most developed countries implement various forms of external support for SMEs. However, previous research has shown that certain types of support have varying effects across countries, depending on the level of development of the green market and the degree of achieved green transformation (Hampton et al., 2024, p.8; Ivanović-Đukić et al., 2025). In order to properly direct efforts, it is necessary to identify the forms of external support that have the greatest impact on the green transformation of SMEs within specific groups of countries—this is the focus of this paper. The aim of the paper is to propose measures, based on the identified forms of support, to policymakers and entrepreneurs in EU and Western Balkan countries that will

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contribute to accelerating the green transformation of SMEs in the future. The underlying assumption of the paper is that external forms of support are key drivers for the introduction of green products in SMEs. To test this hypothesis, factor analysis will be applied using data from the Flash Eurobarometer 545 survey (“SMEs, Green Products and Resource Efficiency”) based on a sample of 12,657 SMEs. According to data from Flash Eurobarometer 545, the most common forms of external support used by SMEs include: public funding such as grants, guarantees, or loans; private funding from banks, investment companies, or venture capital funds; private funding from friends and family; advisory or other non-financial support from public administration; advisory or other non-financial support from private consulting and auditing firms; advisory or other non-financial support from business associations and clusters; as well as advisory or other non-financial support from supply chain partners. This paper will examine various forms of incentives, including support from public administration, consulting firms, supply chains, business associations, clusters, and family. Given the significant differences among countries in the sample in terms of the development level of the green market, the countries will be grouped into clusters.

The paper first provides an overview of the existing literature and empirical research, presenting theoretical considerations on the role and importance of external support in the development of green products and services. This is followed by a description of the methodology and a discussion of the research findings, with an emphasis on potential directions for future research. The final section of the paper presents concluding remarks and recommendations for policymakers and entrepreneurs.

GREEN TRANSFORMATION OF SMES: INNOVATIONS, INSTITUTIONAL FRAMEWORK, AND THE ROLE OF THE EUROPEAN UNION

The concept of sustainable development entails balancing the fulfillment of human needs with the preservation of natural systems to ensure the long-term sustainability of society and the environment. This concept is based on three interconnected dimensions: economic, environmental, and social. The economic dimension encompasses an organization’s impact on the broader economic community but is often unjustifiably reduced solely to financial performance (Lin, 2014). The environmental dimension relates to responsible resource management and the conservation of the natural environment, while the social dimension includes improving quality of life through access to education, health, and social justice. Growing awareness of these aspects has become particularly pronounced since the late 20th century, in response to global environmental and social challenges (Lin, 2014). Given the importance of the sustainable development concept, it is crucial that its principles are not limited to large corporations but are also recognized and applied by SME enterprises.

From the perspective of SMEs, environmental issues are significant for several reasons. First, this type of enterprise has a considerable ecological footprint. Additionally, SMEs are drivers of technological innovations that can be used to address environmental problems. Environmental challenges pose obstacles to the survival and development of SMEs. Furthermore, inadequate climate policies can negatively impact the competitiveness of SMEs (OECD, 2021, p. 9). Increasing expectations from stakeholders require transparent reporting on the company’s impact on society and the environment, as well as on socially responsible activities undertaken in response to changes in the market, regulations, and business models.

In today’s business environment, innovation is essential for the survival and maintenance of a company’s competitive advantage. However, long-term success cannot be based solely on economic goals; it also requires consideration of environmental and social performance. Unlike traditional innovations, which focus on creating added value for the company, green innovations aim to reduce the harmful impacts of processes or products on the environment (Rodrigues & Franco, 2023). For this reason, an increasing number of companies are integrating sustainability as a key business principle, directing innovation activities towards the development of products, processes, and models that simultaneously bring economic benefits and contribute to environmental protection and social responsibility. Therefore, the development of green products and services is becoming increasingly important. However, for SMEs, transitioning to green business models, or producing green products and providing related services, poses a challenge due to limited financial and technical resources.

In this context, external support plays an important role and significance in enabling and accelerating the green transformation process of SMEs. The importance of external support is also confirmed by the European Commission, which in its 2024 Green Deal progress report highlighted that financial support mechanisms in the form of various programs have played a key role in helping SMEs develop green products and technologies (European Commission, 2024, p. 45). More than 3,000 projects focused on reducing CO₂ emissions, increasing resource efficiency, and advancing the circular economy have been financed through these instruments. Additionally, the European Commission emphasizes that between 2020 and 2024, the number of partnerships between the private sector, universities, and research centers has increased, creating conditions for the development of so-called sustainable innovations and strengthening the “triple helix” cooperation model (European Commission, 2024, p. 53).

Sustainable innovation is a form of innovative activity that aligns with the principles of sustainable development, enabling the fulfillment of the needs of the present generation without compromising those of future generations (Pichlak & Szromek, 2021). It involves the simultaneous achievement of economic, environmental, and social benefits, thereby contributing to the long-term sustainability of business operations. According to Hansen and Grosse-Dunker (2013), sustainable innovation encompasses the commercial introduction of new products, services, or systems that deliver a triple bottom line, benefiting the economy, society, and the environment. These three dimensions cannot be viewed separately but form an interdependent whole in which innovations operate at all levels, from individual enterprises to the global ecosystem.

The Net-Zero Industry Act should also be mentioned, as the EU is introducing accelerated administrative procedures and additional financial incentives for companies investing in the production of low-emission technologies, including solar energy, wind power, and energy storage systems (European Commission, 2024, p. 61). Achieving net-zero emissions requires a comprehensive modification of production methods. Companies must adopt innovative and sustainable practices to meet net-zero goals and improve the environmental sustainability of their operations (Sabale et al., 2024). This regulation aims to reduce the EU's dependence on imports while increasing the role of domestic actors in the green transition. Support is also provided through local and regional initiatives, including the development of "green clusters" that bring together SMEs, startups, research organizations, and local governments around common goals - innovation and sustainability. According to the same report, such models have demonstrated a high degree of effectiveness, especially in the fields of renewable energy, organic farming, and sustainable transportation (European Commission, 2024, p. 58). Also, in February 2023, the European Commission presented the Green Deal Industrial Plan. This plan is intended to improve the competitiveness of European industry in the context of the transition to climate neutrality. The Industrial Plan aims to provide a more favorable environment for increasing production capacities with net-zero emissions, all with the goal of achieving ambitious climate targets (Villa, 2024, p. 22).

Based on the above, it can be concluded that external forms of support - financial, technical, and regulatory - constitute the foundation for the development of sustainable business models in Europe. Their availability and strategic direction enable not only faster adaptation to climate goals but also the creation of new market opportunities, job creation, and the strengthening of the EU's technological sovereignty. Therefore, external support is not merely assistance but also a strategic instrument in shaping a competitive and sustainable economy.

CHARACTERISTICS OF THE SAMPLE AND METHODOLOGICAL FRAMEWORK

SMEs employ approximately 83 million people and contribute to about half of the European Union's total gross domestic product. Although each SME individually emits a relatively small amount of CO₂ on average around 67 tons annually their sheer number makes the total emissions quite significant, accounting for as much as 63% of total CO₂ emissions from the business sector (European Commission, 2024). According to the European Commission report (2024), SMEs are responsible for between 60% and 70% of total industrial pollution in Europe. On the other hand, their participation in energy and resource efficiency practices, as well as in the supply of "green" products, remains relatively low. Therefore, the aim of this paper is to examine which type of external support contributes most to the development of green products.

Due to the pressing need for the green transformation of SMEs in Europe and the fact that SMEs face numerous barriers in attempting to implement this transformation, many countries are introducing various forms of external support. In order to identify the external incentives that contribute most significantly to the introduction of green products in SMEs, an empirical analysis was conducted of the institutions and types of support they provide.

The study used data from the Flash Eurobarometer covering 37 European countries, obtained from the official website of the European Commission. The analysis was conducted using factor analysis to identify the main dimensions of external support, followed by cluster analysis to group countries based on similarities in these dimensions. The applied methodology provides insight into behavioral patterns and attitudes at the level of European countries.

It is a fact that SMEs offering "green" products or services require various forms of support. They most often rely on their own financial resources, internal technical capacities, and external assistance. A list of European countries that offer "green" products, along with the types of support they utilize based on the 2024 European Commission Report is presented in Table 1.

Table 1 European countries included in the study, SMEs offering green products and services in 2021 and 2024

Country	SMEs offer green products or services in 2021		SMEs offer green products or services in 2024		Rate of change in the number of SMEs (%)	
	Yes	No, but you are planning to do so in the next 2 years	Yes	No, but you are planning to do so in the next 2 years	Yes	No
Belgium	187	71	184	54	-1.60	-23.94
Bulgaria	109	53	104	75	-4.59	41.51
Czech Republic	106	46	123	61	16.04	32.61
Denmark	167	13	177	24	5.99	84.62
Germany	171	53	194	34	13.45	-35.85
Estonia	134	47	102	41	-23.88	-12.77
Ireland	142	132	152	132	7.04	0.00
Greece	214	146	221	111	3.27	-23.97
Spain	182	54	199	66	9.34	22.22
France	210	53	203	80	-3.33	50.94
Croatia	138	91	110	44	-20.29	-51.65
Italy	150	64	153	86	2.00	34.38
Cyprus	78	44	41	28	-47.44	-36.36
Latvia	109	60	129	20	18.35	-66.67
Lithuania	148	51	136	42	-8.11	-17.65
Luxembourg	98	28	101	25	3.06	-10.71
Hungary	107	47	74	31	-30.84	-34.04
Malta	70	27	79	25	12.86	-7.41
Netherlands	247	28	251	18	1.62	-35.71
Austria	209	47	192	21	-8.13	-55.32
Poland	150	53	141	62	-6.00	16.98
Portugal	148	115	141	101	-4.73	-12.17
Romania	138	173	109	129	-21.01	-25.43
Slovenia	197	48	158	36	-19.80	-25.00
Slovakia	196	63	176	62	-10.20	-1.59
Finland	198	35	167	22	-15.66	-37.14
Sweden	240	27	187	42	-22.08	55.56
United Kingdom	154	66	128	64	-16.88	-3.03
Iceland	85	53	78	16	-31.76	-5.66
Norway	179	125	243	46	-30.17	-52.80
Switzerland	24	18	192	24	8.33	-55.56
Montenegro	115	116	26	8	-2.61	-25.86
Moldova	20	20	37	13	15.00	-85.00
North Macedonia	121	24	125	59	-35.54	-33.33
Albania	156	48	23	3	55.77	-4.17
Serbia	40	25	112	86	-7.50	-48.00
Turkey	144	54	58	50	15.28	-24.07

Source: Author's work based on the European Commission Report

Based on the data presented in Table 1, it is essential to analyze the rate of change in the number of SMEs that already offer green products and services, as well as those that do not yet offer them but plan to. The following key points can be observed:

- Most countries in Europe show a decline in the share of SMEs that already offer green products. Out of 36 countries, 23 have a negative growth rate, with some countries experiencing double-digit declines - Estonia (-23.9%), Slovakia (-10.2%), and Romania (-21%).

- Countries that recorded an increase in the supply of green products and services in 2024 compared to 2021 include the Czech Republic (16%), Iceland (15.3%), Moldova (15%), and Denmark (6%). It is possible that this growth was influenced by external financial support or that the 2024 SME sample focused more on actively green SMEs.
- When it comes to SMEs in European countries that have not yet started producing green products but plan to, a significant decline was recorded in Moldova (-85%), Norway (-52%), Sweden (-37.1%), and Austria (-55.3%). These results suggest that a large number of SMEs in these countries either abandoned their plans or moved into the “Yes” category.
- Romania should be highlighted, as the “Yes” rate dropped by -21%, and the planned category dropped by -25.4%, indicating that some SMEs either abandoned their plans or exited the green product market altogether. Also, although Moldova recorded a 15% increase in the number of SMEs offering green products and services, the number of those planning to do so fell from 20 to 13, meaning that almost all who had planned to launch green products are now active. Meanwhile, Denmark and the Czech Republic show a consistent and stable increase, suggesting that the growth in the “Yes” category is also accompanied by an increase in planned activity.

Based on the above, it can be concluded that the data on the rates of change in the number of SMEs offering green products and services in many countries is in transition. This indicates that some SMEs have successfully implemented their planned activities and moved into actively offering green products, but there is also a noticeable decline in the number of SMEs involved in the development of green products. This situation raises a research question namely, to examine the external support incentives that represent one of the key factors for explaining these differences and for shaping effective policies to further promote the green transformation of the SME sector. Building on the descriptive analysis of the forms of support available to small and medium-sized enterprises in 37 countries, as well as the stated research question, this paper applies factor analysis to identify hidden patterns (latent dimensions) that link various sources of financial and non-financial assistance. The use of this method enables the reduction of complex data and the identification of key structures that shape the institutional and network context of support. Additionally, through cluster analysis, countries were grouped based on similarities in their patterns of support usage, opening up possibilities for comparative analysis and the formulation of targeted policy recommendations for supporting SMEs. The forms of support analyzed are presented in Table 2.

Table 2 Type of external support

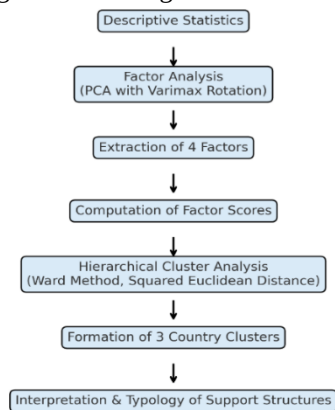
Type of external support	Acronym
Public funding such as grants, quarantes or loans	PUBFUN
Private funding from a bank, investment commpany or venture capital fund	PRFUN1
Private funding from friends or realtives	PRFUN2
Advise or other non-financial assistance from public administration	NONF1
advice or other non-financial assistance fomprivate consulting and audit companies	NONF2
advice or other non-financial assistance fom business associations and clusters	NONF3
advice or other non-financial assistance fom supply chain partners	NONF4
Other (spontaneous)	OTHER
Dont'know	DN

Source: Author's work based on available data

This study employed three complementary statistical procedures: descriptive statistics, factor analysis, and cluster analysis with the aim of comprehensively and structurally examining the support system for SMEs in the context of the green transition. First, descriptive statistics were conducted to determine the basic level of utilization of various forms of support public and private, financial and non-financial in each country. This analysis enabled the identification of general patterns and differences among countries, as well as the recognition of the most and least commonly used forms of support. Next, factor analysis was applied to identify latent dimensions that link the observed variables and reveal underlying support structures that are not directly visible. Using the principal component analysis (PCA) method with Varimax rotation, a large number of interrelated variables were reduced to four theoretically interpretable factors, increasing clarity and allowing for a deeper analysis of the institutional

environment. Finally, based on the resulting factor scores, cluster analysis was conducted to identify groups of countries with similar patterns of SME support. Using a hierarchical approach (Ward's method), clusters were extracted that reflect similarities in institutional development, access to financing, and reliance on network-based resources. This combined approach made it possible to move from the description of individual variables to a structured understanding of institutional patterns and the classification of countries, forming a basis for the formulation of targeted recommendations and the development of different support models tailored to the specific characteristics of each group of countries.

Fig. 1 Methodological framework of the analysis



Source: Authors

Table 3 presents the results of descriptive statistics.

Table 3 Descriptive statistics of selected variables

Variable	N	Min	Max	Mean	Std. Deviation
PUBFUN	37	.00	79.00	19.9730	17.06765
PRFUN1	37	3.00	81.00	20.1622	14.09002
PRFUN2	37	.00	85.00	11.8378	16.31889
NONF1	37	.00	82.00	20.3784	16.78351
NONF2	37	.00	80.00	26.0811	18.59118
NONF3	37	.00	86.00	28.2432	21.40146
NONF4	37	.00	85.00	39.5135	21.36407
OTHER	37	.00	35.00	9.4054	9.42944
DN	37	.00	37.00	6.9730	8.78599

Sources: Author's calculation in SPSS v.26

Based on the results of the descriptive statistics, it can be concluded that public funding (PUBFUN) accounts for an average of 20% of the support provided to enterprises for green transformation across all countries. The analysis includes nine variables representing financial and non-financial support, including the frequency of “don’t know” responses. The results show that the most common form of support is non-financial assistance from supply chain partners (NONF4), with an average value of 39.51% and a standard deviation of 21.36, indicating significant variability among countries. This type of support is most prominent in Turkey (85% of surveyed enterprises), while Malta records none (0). This is followed by non-financial assistance from business associations and clusters (NONF3), with an average of 28.24%, the highest being in Albania (86% of surveyed enterprises) and the lowest in Cyprus (0). Private consultants and auditing firms (NONF2), with an average of 26.08%, are also most prevalent in Turkey (80%), while completely absent in Malta. Public funding (PUBFUN) and private funding from business sources (PRFUN1) record average values of 19.97% and 20.16%, respectively. Public funding is most represented in Estonia (79% of surveyed enterprises) and completely absent in Cyprus (0). Private funding from the banking sector is most commonly used in Portugal (81%) and least in the Netherlands (3%). Interestingly, private aid from friends and family (PRFUN2) has a very low average value (11.84%), but its use is extremely high in Turkey (85%) and completely absent in Latvia (0). Advice from public administration (NONF1) peaks in Turkey (82%), while it is negligible in Cyprus (0). This country registers the minimum value several times, indicating a limited institutional support framework for green initiatives. The “Other” category (OTHER) is highest in Cyprus (35%) and lowest in the Czech Republic (0). The “Don’t know” category (DN) appears most frequently in responses from Montenegro (37%).

This analysis highlights that strategies for supporting green initiatives vary significantly between countries. Some countries rely almost exclusively on institutional and market mechanisms (e.g., Estonia, Portugal), while others depend mainly on informal or network-based forms of support (e.g., Turkey, Albania). The results of the descriptive statistics suggest a need for deeper qualitative research into local policies and institutional frameworks to better understand the factors that enable or limit access to certain types of support. Based on the analyzed results of the descriptive statistics, insights can be gained into the basic characteristics of the observed sample and the variables under study.

EMPIRICAL RESULTS AND DISCUSSION

All sources of funding will be included in the factor analysis for a detailed examination. Factor analysis is considered a relevant statistical tool for analyzing these factors. The method to be used for factor extraction is Principal Component Analysis (PCA). The data will be analyzed using the SPSS 26 statistical software package. To identify the latent dimensions of support available to small and medium-sized enterprises (SMEs) in different countries, a factor analysis was conducted using data from 37 countries. The analyzed variables include both financial and non-financial forms of support. The analysis identified four factors that together explain 71.71% of the total variance. Based on the rotated component matrix, the factors were named accordingly.

Table 4 Component Matrix and Rotated Component Matrix

Component Matrix				
	F1	F2	F3	F4
NONF2	.832	.070	.054	.008
NONF1	.748	.051	.391	-.176
NONF4	.671	-.352	-.313	.002
NONF3	.541	-.522	.324	-.009
OTHER	.066	.728	-.278	-.114
PRFUN2	-.454	-.548	-.176	.510
PRFUN1	-.156	.469	.658	.419
PUBFUN	.414	.285	-.539	.159
DN	-.483	-.165	.080	-.759
Rotated Component Matrix				
	F1	F2	F3	F4
NONF1	.856	.063	.097	-.024
NONF2	.720	-.044	.382	.187
PRFUN2	-.676	.543	.202	.062
NONF3	.043	-.781	.094	-.059
OTHER	.543	.583	.093	.164
DN	-.133	-.013	-.900	.125
PUBFUN	.084	-.431	.499	.354
PRFUN1	.066	-.037	.162	-.906
NONF4	.386	.177	.350	.608

Sources: Author's calculation in SPSS v.26

The results presented in Table 5 provide factor scores (F1, F2, F3, F4). The analysis identified the following factors:

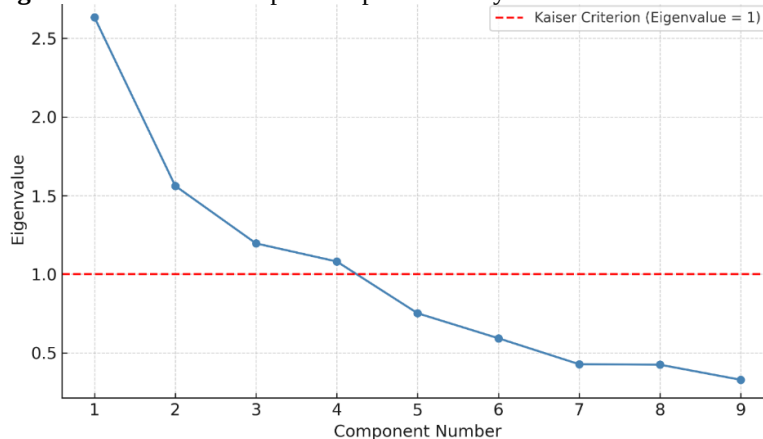
Table 5 Allocation of variables across extracted factors

Dominant factor	Variable	Factor value
Factor 1 – Formal advisory support	NONF1	0.856
	NONF2	0.720
Factor 2 – Connection and collective support	PRFUN2	0.583
	NONF3	-0.781
	OTHER	0.543
Factor 3 – Awareness of institutional funding	PUBFUN	0.499
	DN	-0.900
Factor 4 – Independent market orientation	NONF4	0.608
	PRFUN1	-0.906

Sources: Author's calculation in SPSS v.26

Factor analysis enabled the reduction of data complexity and the identification of key forms of support that policymakers can target for development or strengthening. Based on the rotated component matrix, variables were assigned to the factor on which they have the highest absolute loading, thereby identifying their dominant contribution to the latent dimensions. Each variable was assigned exclusively to one factor, allowing for clear thematic separation of the factors and avoiding overlap in meaning between dimensions. This classification forms the basis for further interpretation of the role of individual types of support and enables more precise typologization of institutional patterns through cluster analysis.

Fig 1 Scree Plot of Principal Component Analysis



Sources: Author's calculation in SPSS v.26

The figure shows the values for each of the nine extracted components. The red line represents Kaiser's criterion. The components to the left of this line (components 1–4) have eigenvalues greater than 1 and are therefore retained in the factor solution. The graph clearly shows a drop after the fourth component, indicating a natural point beyond which the contribution of new components decreases sharply. This visual confirmation supports the statistical decision to retain four factors, as they represent the most significant patterns in the analyzed data.

Table 5 Total Variance Explained

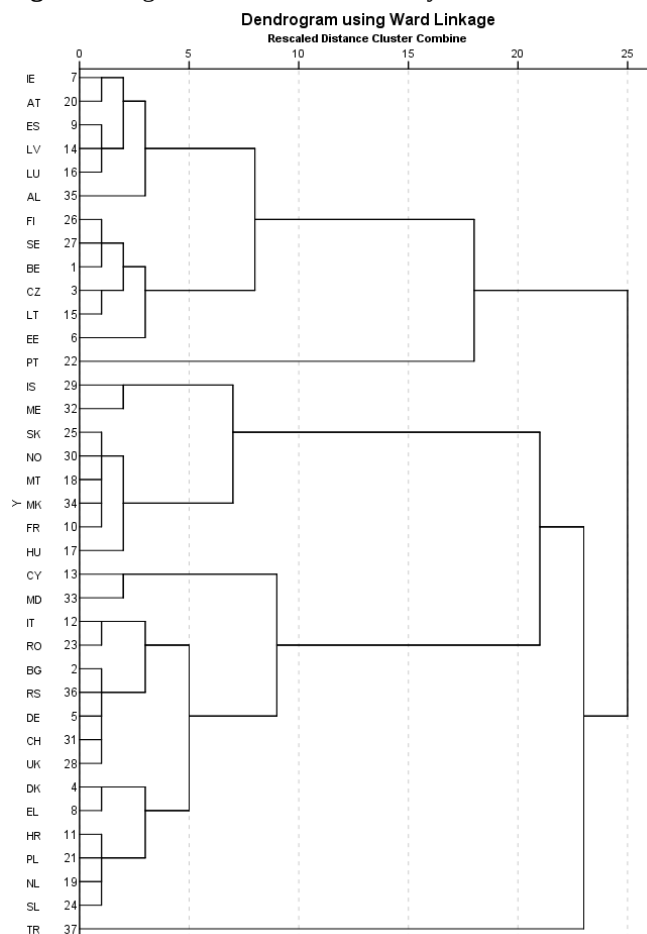
Component	Initial Eigenvalues			Extraction Sums of Squared Rotation			Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.634	29.263	29.263	2.634	29.263	29.263	2.181	24.232	24.232
2	1.562	17.354	46.618	1.562	17.354	46.618	1.471	16.339	40.571
3	1.196	13.292	59.910	1.196	13.292	59.910	1.421	15.791	56.362
4	1.081	12.011	71.921	1.081	12.011	71.921	1.400	15.558	71.921
5	.752	8.356	80.276						
6	.593	6.589	86.865						
7	.428	4.760	91.625						
8	.425	4.717	96.341						
9	.329	3.659	100.000						

Sources: Author's calculation in SPSS v.26

This table is a key result of the factor analysis and shows how much variance in the original data is explained by each extracted factor (latent dimension). The principal component factor analysis extracted four factors with eigenvalues greater than 1, which together explain 71.92% of the total variance. The first factor explains 24.23% of the variance, the second 16.33%, the third 15.79%, and the fourth 15.55%. These results indicate that the factor structure reliably and consistently identifies patterns among the observed variables. The high cumulative percentage suggests that the majority of variability in the data is successfully explained by these latent dimensions. In order to account for institutional differences among countries in terms of green market development and the expected impact of different forms of support for SMEs, cluster analysis was applied in the study. This method enabled the identification of relatively homogeneous groups of countries that share similar characteristics in terms of institutional support, financial environment, and levels of awareness relevant to the green transition of SMEs. The results of the hierarchical analysis conducted using Ward's method are presented through a dendrogram, which graphically illustrates the degree of similarity between EU countries and other European countries analyzed, based

on the created factor groups. The visualization of the clustering allowed for the identification of countries that exhibit proximity in the observed factors. Based on the distribution of countries within the groups, the optimal number of clusters is 3 (Fig. 2).

Fig 2 Dendrogram based on cluster analysis of data



Sources: Author's calculation in SPSS v.26

Based on the results shown in the dendrogram, the first cluster includes 13 countries with the highest number of SMEs offering green products. The countries in this cluster are: Ireland, Austria, Spain, Latvia, Luxembourg, Albania, Finland, Sweden, Belgium, Czech Republic, Lithuania, Estonia, and Portugal. The results indicate that in these countries, SMEs benefit from strong institutional and advisory support, often relying on formal financial sources. Factors 1 and 3 are dominant in this cluster.

The second cluster includes Iceland, Montenegro, Slovakia, Norway, Malta, North Macedonia, France, Hungary, Cyprus, and Moldova. The results show that SMEs in these countries rely on network-based support and advice, and their institutional systems are in development. Factors 2 and 4 are dominant here. These countries primarily depend on network-based support and exhibit variable access to institutional resources. This cluster includes countries with moderate institutional development, characterized by a mix of formal and informal support networks. Awareness of institutional funding is moderate but not negative. In the future, these countries should work on improving access to institutional financing, developing public and private financial structures, and increasing the level of awareness. Countries from the first cluster can serve as a model for improvement.

The third cluster comprises countries with the lowest level of green market development. These include: Italy, Romania, Bulgaria, Serbia, Germany, Switzerland, the United Kingdom, Denmark, Croatia, Greece, Poland, the Netherlands, Slovenia, and Turkey. Factors 2 and 4 are also dominant in this cluster. It brings together institutionally diverse countries – developed Western European nations such as Germany, Switzerland, and the Netherlands, as well as several transitional and Southeastern European economies. This group is marked by negative values for Factor 3, indicating low awareness of formal support mechanisms. There is a pronounced reliance on market partners and a lack of clearly structured SME support policies, even in developed economies. This cluster shows a high degree of internal variability and represents a mixed model of SME support, combining elements of institutional development with informal forms of support.

CONCLUSION

This paper analyzed the incentives for the green transformation of SMEs in Europe with the aim of more effectively implementing the strategies and policies formulated by the European Commission, such as the 2030 Agenda, the Green Deal, and the SME Strategy. More specifically, the study empirically examined the contribution of various forms of external support, such as support from public administration, consulting firms, supply chain partners, business associations, clusters, and family, in the adoption of green products. To achieve this, factor analysis was applied in order to reduce a complex set of variables, including various types of financial and non-financial support (public, private, formal, and informal), into a smaller number of interpretable dimensions. This approach made it possible to identify patterns that would not be visible through simple observation of individual variables. After identifying four latent dimensions of support, cluster analysis was conducted to group countries based on factor scores, identifying those with similar institutional and network contexts in supporting SMEs. This enabled the development of a typology of countries, which provides a basis for comparative analysis and the design of recommendations tailored to the actual institutional capacities and development needs of each group of countries. The combination of factor and cluster analysis allowed for the transformation of statistically unstructured data into a structurally grounded classification of countries, contributing to a better understanding of how SME support functions in different contexts, and how policies can be differentiated to more effectively support the green transition.

Based on the established country typology derived from the cluster analysis, it is recommended to implement differentiated development policies that take into account the specific institutional patterns and capacity levels within each group. For countries in the first cluster, characterized by a high degree of institutional development, systematic access to formal support instruments, and stable stakeholder awareness, it is recommended to further direct development resources toward supporting innovation processes and the green transformation of the SME sector. Additionally, it is essential to encourage cross-border cooperation and institutionalized exchange of best practices in order to successfully transfer existing models into a broader regional context. Countries belonging to the second cluster, which demonstrate selective access to informal and network-based forms of support, face challenges related to a fragmented institutional structure. It is recommended to implement reforms aimed at consolidating institutional mechanisms, strengthening coordination between formal and informal actors, and building the capacity of public administration for more effective management of SME support, particularly in the areas of green transition and digital transformation. Within the third cluster, which is characterized by a strong market orientation and a notably low level of institutional awareness, the key recommendation is to develop reliable, accessible, and transparent communication channels to inform businesses about existing support instruments. Additionally, it is necessary to implement measures aimed at increasing trust in institutions, including the digitalization of public services, transparent governance, and targeted empowerment programs for the SME sector. These steps are essential to bridge the gap between the nominal availability of support and its actual use. Overall, the results of the cluster analysis highlight the need for carefully tailored development policies that align with the specific needs and institutional characteristics of each group of countries. This ensures greater effectiveness and sustainability of national and regional strategies focused on strengthening the small and medium-sized enterprise sector.

Therefore, based on the above, it can be concluded that the results indicate that the greatest contribution to the adoption of green products in SMEs comes from public administration, consulting companies, and supply chain partners. This is consistent with previous research, which confirms that institutional support, particularly through regulatory frameworks and public administration policies, has a significant impact on ecological innovations in small and medium-sized enterprises (Yusliza et al., 2020). Consulting firms facilitate the transition of SMEs to sustainable business models by transferring expert knowledge and experience (Bossle et al., 2016). Additionally, supply chain partners, especially key customers and suppliers, motivate SMEs to introduce green products through their demands and expectations, helping them maintain competitiveness and align with market standards (Kamaldeen Smith, 2024). These findings highlight the importance of a networked and coordinated support ecosystem in which SMEs operate, in order to accelerate the green transformation process.

Based on the examination of the role of external support in the development of green products and services in SMEs, the results showed that countries clearly differ in terms of institutional capacity, the availability of financial and non-financial assistance, as well as the level of networking and awareness among enterprises. Cluster analysis identified three distinct groups. The first cluster is characterized by high institutional capacity and a well-developed system of formal financial and non-financial instruments (Factor 3), along with a moderate dependence on advisory services (Factor 1). SMEs in these countries have easy access to grants, loans, and professional consulting, which positively impacts their green transformation. The second cluster includes countries with medium institutional capacity and pronounced collective support (Factor 2). This support is provided to SMEs through business associations, clusters, and partnership networks. It facilitates mutual knowledge exchange but also requires additional investment in the formalization of institutional frameworks. Countries in the third cluster are characterized by low levels of awareness and predominantly informal forms of support. This indicates a lack of

institutional transparency and capacity, which poses a barrier to green innovation. Reforms are needed to improve access to financial instruments, education, and advisory services.

ACKNOWLEDGEMENT

This research is part of the 101120390 - USE IPM - HORIZON-WIDERA-2022-TALENTS-03-01 project, funded by the European Union. Views and opinions expressed are however those of the authors only and do not necessarily reflect those of the European Union or the European Research Executive Agency. Neither the European Union nor the European Research Executive Agency can be held responsible for them

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THE ROLE OF PUBLIC-PRIVATE PARTNERSHIPS IN THE SUCCESS OF HEALTHCARE DECISION SUPPORT SYSTEMS IN THE SOUTH AFRICAN HEALTHCARE SECTOR

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Abstract:

This study explores the factors influencing the success of digital healthcare decision support systems in the developing country of South Africa. Employing a qualitative case study approach, data were gathered from hospital documentation and interviews conducted with the maternity and oncology departments, the pharmacy unit, hospital management, and the information technology department within a South African hospital, utilising an established clinical decision support system (CDSS). The study identified that one key factor in the success of CDSS in a developing country is the use of public-private partnerships (PPP). These partnerships, involving public healthcare institutions and private technology providers, were found to be effective in creating synergies that enhance the effectiveness of decision support systems. Additionally, by promoting digital accountability, CDSS have been shown to improve the quality and efficiency of healthcare. The findings can empower healthcare managers, policymakers, and health information system developers to shape and implement digitally enabled healthcare delivery strategies. The study's results provide a practical roadmap for implementing digital decision-making in hospitals within a developing country, helping to balance clinical complexity with available healthcare resources.

Keywords: Public-private partnerships, Healthcare Decision Support Systems, Information systems success

INTRODUCTION

A growing body of evidence suggests that healthcare systems are facing challenges related to escalating healthcare costs and the provision of universal health coverage (Boniol et al., 2022). In both developing and developed countries, healthcare costs are rising without corresponding improvements in quality and efficiency (Bastian et al., 2016). The increase in healthcare costs, coupled with poor outcomes, has become a global concern and a driving force behind healthcare reform. According to Das et al. (2018), universal healthcare is insufficient; health systems should be designed to provide cost-effective, equitable, and high-quality healthcare services. Scholars agree that even in nations with limited healthcare resources, healthcare systems should be structured to ensure that high-quality universal healthcare access is achievable (Woldemariam and Jimma, 2023). The disparity in human healthcare resources between the private and public sectors, along with the increasing demand for high-quality healthcare services, underscores the need for innovative healthcare delivery methods. According to Taheri Moghadam et al. (2021), the limited availability of healthcare human resources, combined with the variability and often suboptimal quality of medical care, has drawn attention to interventions that might prevent medical errors and promote the efficient use of medical resources embedded in digital health systems. Additionally, White et al. (2023) and Sutton et al. (2020) emphasise that a healthcare business model redesign, coupled with technological advances such as CDSS, is a potential prescription for the ailing healthcare systems in limited resource settings. Furthermore, researchers agree that information and communication technologies (ICT) are effective in bridging the digital divide among various social groups and in addressing the unequal distribution of healthcare services (Ngene et al., 2023, Woods et al., 2024). Despite the acknowledged necessity of employing technology to improve healthcare processes, the literature suggests that inadequate infrastructure, insufficient ICT skills, and the absence of a policy framework for digital health in developing countries impede technology adoption (Hutson-Stone, 2022). Other factors limiting the use of digital health include the shortage of technical skills, the lack of established career paths for health informatics specialists in the public healthcare sector, and resistance from healthcare personnel (Mueller and Govender, 2016).

Clinical decision support systems

Clinical decision support systems are computer tools and algorithms embedded in electronic medical records or exist separately to assist and guide doctors, nurses, physical therapists, and patients during the consultation, with information that guides healthcare decision-making (Stehlik et al., 2015, Sutton et al., 2020, Abell et al., 2023). Though definitions vary, CDSS aims to assist healthcare professionals in diagnosing, treating, preventing, and mitigating diseases (Rao and Palma, 2022). Computer-generated clinical knowledge and patient-related information are intelligently filtered or presented to the user at appropriate times during clinical care to enhance

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patient care (Ji et al., 2021). The main goal of CDSS is to reduce medical errors, improve patient safety, enhance the quality of care, and streamline healthcare providers' decision-making processes influenced by technical features (White et al., 2023, Khalfallah et al., 2023). The successful deployment of CDSS in hospitals with limited resources depends on overcoming resource allocation constraints, enhancing healthcare worker capabilities, and fostering an environment that supports technology adoption through adequate infrastructure, training, and policy development. A more comprehensive approach that incorporates both technological and contextual understanding is essential for transforming the healthcare landscape, ultimately contributing to improved health outcomes and greater equity in care delivery.

Public-private partnerships in healthcare

A Public-Private Partnership (PPP) in healthcare is a collaboration between the government and private sector entities to provide healthcare services or develop healthcare infrastructure. These partnerships are typically formed to combine the strengths of both sectors—public entities bring regulatory oversight, funding, and public health expertise, while private companies contribute innovation, efficiency, and specialised knowledge (PWC, 2015, Maslova and Sokolov, 2017). A conceptual paper by Sharma (2023) argued that PPP alleviates healthcare resource constraints by adopting the 3R framework, which entails researching the implementation of new healthcare technology, providing financial resources and remittances to develop and execute capabilities, skills, and knowledge for healthcare delivery. Abdul et al. (2024) categorise PPPs into two main types: research-focused and service delivery-focused PPPs. Research-focused PPPs unite government agencies, academic institutions, pharmaceutical companies, and other stakeholders to advance medical research and develop new treatments or technologies. These collaborations facilitate the sharing of scientific knowledge, expertise, and infrastructure, thereby accelerating the discovery and development of innovative healthcare solutions. Conversely, service delivery PPPs involve partnerships between public healthcare providers and private organisations to enhance healthcare services (Sharma, 2023). These collaborations can cover various areas, including the provision of medical services. By harnessing the efficiency and innovation of the private sector, service delivery partnerships seek to improve the accessibility, quality, and affordability of healthcare services within communities (Kosycarz et al., 2019). Despite these advantages, there remains a lack of robust empirical evidence regarding the relationship between PPPs and the success of CDSS in healthcare settings with limited resources. Thus, the research objective was to understand the contextual factors influencing the success of CDSS; this research explored how these factors impact the success of CDSS.

METHODOLOGY

This paper presents the findings of a doctoral thesis that investigated the antecedents to the success of CDSS in a South African hospital with limited healthcare resources. A multi-case method design was employed to gather in-depth insights into the influence of CDSS across different clinical departments, aiming to integrate best practices and procedures. The research design, which employed multiple case studies, enabled an in-depth exploration of the factors contributing to the success of CDSS within and across different departments within a single hospital (Yin, 2017). The case study explored interconnected and interrelated relationships and processes within its social settings (Ebneyamini and Sadeghi Moghadam, 2018). In this respect, CDSS success entailed exploring the sociotechnical interaction between clinical process design, CDSS technical design, and initiatives required to sustain CDSS success. Thus, data were collected at Philani Hospital across different clinical departments within the hospital. Data comprising hospital documentation and interviews were collected from two clinical units, the pharmacy unit, hospital management, and the ICT department. The cases were selected because they provide a basis for exploring CDSS success and its influence on healthcare outcomes in cases with different contexts regarding services offered by the designated departments. Additionally, they often have limited access to healthcare resources. Researchers underscored the need to conduct an in-depth analysis of the organisational context to interpret digital health's contribution in a complex and highly adaptive environment (Kraus et al., 2021, Petracca et al., 2020). Drawing on Yin (2017), the nuances between the cases broaden the understanding of CDSS success from different perspectives, enriching theory building and improving the study rigour. Case research scholars assert that gathering data from multiple cases provides rich and complex data from different perspectives (Yin, 2017) and viewpoints, thereby adding variation and complexity, and enabling the collection of rich, complex, and detailed data (Smith, 2018).

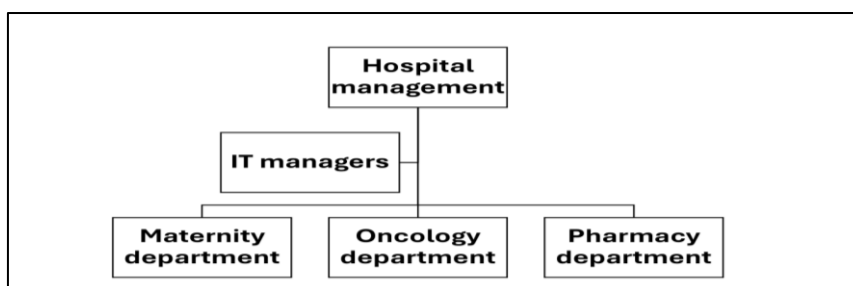


Figure 6: Case selection

Given the above arguments, this study selected departments within Philani Hospital that offer different healthcare services. Philani Hospital (Pseudonym) is a public-private partnership (PPP) between the South African Department of Health and the private consortium located in major city. It is a tertiary and quaternary hospital where patients are referred from other hospitals via an electronic and telephone booking system. The hospital has more than thirty departments offering tertiary and quaternary health services. Situated in a major city, its catchment area covers the majority of two South African provinces. At the end of 2022, the clinical staff consisted of more than six hundred nurses and more than two hundred doctors. Philani Hospital is the first hospital in Africa to deploy an advanced electronic medical record (EMR) system, which assists hospital administration and clinical care services across all clinical departments (Msomi et al., 2021). **Error! Reference source not found.** shows that one non-clinical (Pharmacy) and two clinical (Maternity and Oncology) departments were selected for case research. The hospital management and information systems managers were included as an additional case study to understand the alignment between CDSS implementation and expected goals, as well as how information systems can drive success in hospitals and departments. According to Smith (2018), gathering data from multiple sources enables the analysis of data from various perspectives, which enhances the credibility of the research conclusions. The selected departments provide healthcare services ranging from acute, semi-acute, and chronic patient care to comprehensive patient care, allowing for the exploration of CDSS in various clinical contexts. Furthermore, the selected cases provided a variety and diversity of clinical care services within the same hospital, which was helpful for theoretical replication.

Although the selected cases utilise the same CDSS for patient care, the implementation varies across different departments due to variations in service offerings and clinical complexity. Gathering data from the users of these departments provided unique empirical evidence to support theory development (Mandal, 2020, Rubbio et al., 2020). The pharmacy department uses the CDSS differently from clinical departments and offers valuable insights into specific practices in a non-clinical setting. The selected cases provided rich and comprehensive data from artefacts, documents, and interviews. A phased data collection approach entailed phase one of the study, which began with artefact analysis and document review to gather initial data, followed by interviews with each selected case during phase two of data collection. Artefact analysis entailed evaluating and analysing the features of the CDSS utilised at Philani Hospital. In this development phase, the findings from phase one were used to design a semi-structured interview data collection guide (Bogna et al., 2020). The research aims and objectives were partially achieved by conducting semi-structured interviews to gather data using open-ended questions, guided by the interview guide to ensure that all pertinent study questions were covered. Conducting semi-structured interviews enabled the exploration of research questions from multiple perspectives. Participants performing different clinical duties with varying clinical skills and patient responsibilities were purposefully selected for the interviews. A total of 32 participants were interviewed, comprising 11 doctors, eight nurses, seven pharmacists, four clinical managers, and two IT managers.

RESEARCH FINDINGS

Empirical evidence from managers indicated that the public-private partnership contract between Philani Hospital and the private consortium supplies the hospital with sufficient resources, facilitating high-quality care that aligns with its vision and mission.

A senior manager explained: "We are not profit-driven; we are here to render services to the public regarding patient care; we have a unitary fee payment for this public-private contract" (Respondent 43). One manager described the PPP contractual agreement, "So basically, ...us, the doctors and the nurses, I will say the workers are government employees, but the rest of the services are provided by the private partner, who is also servicing us with the electronic system, so everything else is private" (Respondent 38). Similar to the desktop and document review findings conducted during the first phase of the research, managers noted that the private partner manages and operates the facility, providing medical equipment and health information systems. The information systems manager boasted: "You cannot find a hospital in South Africa that is fully resourced regarding equipment. Others are eager and dying to have our resources in terms of equipment and infrastructure" (Respondent 43).

Managers explained that the private partner's contractual obligations and financial penalties for non-performance influence the quality of service by ensuring reliable and efficient technical support. For example, one participant asserted: "...because of this private partnership, things need to be done in a certain time because if they do not do it, they incur a penalty" (Respondent 38). Previous research found a positive relationship between the quality of service and user satisfaction, resulting in the effective use of CDSS (Walle et al., 2023, Ahmad et al., 2023). Managers also explained that the quality of support and maintenance services ensures minimal disruption and maximises system uptime. Managers explained that the private partner provides reliable technical infrastructure and operational efficiency despite electricity constraints experienced by most hospitals in these settings: "...if a nurse or doctor is working and writing a note and load shedding kicks in, it does not lose the information because it is on the main server with continuous power" (Respondent 31).

Managers also maintained that the private partner provides high-quality training and regular refresher courses to all healthcare professionals, which in turn influences the ease of use, user satisfaction, and effective use of CDSS. Participants explained, "... you start with the training on the system; you have to learn how to use the computer. You are not allowed to go to the ward 'til you pass. I think there is a pass mark of seventy-one per cent" (Respondent 38). Despite adequate technical resources, managers expressed concerns that the shortage of healthcare professionals persists, limiting the full benefits of the CDSS.

Managers raised concerns about the shortage of healthcare professionals stemming from the inability to employ staff due to the moratorium on the employment of healthcare professionals, "We also need human resources such as people ... we have a moratorium where we could not fill the post due to funding constraints" (Respondent 45). Like healthcare professionals, managers expressed concerns about the lack of alignment between human resources, despite the private partner providing high-quality infrastructure and modern information systems. In this respect, one participant added: "Other hospitals have human resources but not equipment, but we have equipment, not human resources" (Respondent 43). The findings highlight a lack of alignment in healthcare delivery strategy to realise the full benefits of investment in a public-private partnership. There was a general view that, despite the CDSS providing efficient and effective healthcare, the healthcare-to-patient ratio still needed to be maintained. One interviewee asserted, "...our information system has a vast capability; it is just due to human resource constraints and we do not have the time to engage with it as effectively as we could, but there is potential" (Respondent 33). Like healthcare professionals, there was also a shortage of managers who could efficiently utilise the IT system's capabilities.

Most managers indicated that the CDSS enables remote access to comprehensive staffing and bed occupancy information, providing data that facilitates the distribution of limited healthcare resources based on demand and improves the ratio of healthcare professionals to patients. One manager explained, "I can view bed occupancy of each unit and how many staff they have" (Respondent 38). Another manager added, "We also look at the statistics for each theatre, and are able to evaluate which theatres are being over-utilised and which are under-utilised and then inform efficiencies from that perspective" (Respondent 33). Insights from the managers' perspectives reveal a relationship between access to accurate information and the effective use of CDSS by managers, which in turn influences the efficiency and effectiveness of care. Based on the Theory of Constraints, CDSS help managers utilise resources efficiently, ensuring that none is underutilised, which in turn enhances clinical outcomes (Goldratt and Cox, 2016, Tortorella et al., 2022).

DISCUSSION OF FINDINGS

Empirical evidence from this research suggests that public-private partnerships play a crucial role in the design, implementation, and delivery of cost-effective care utilising health information systems. Tsegaye and Flowerday (2021) argued that in South Africa, new healthcare technologies provide modest incremental benefits at significant total costs, unlike in other contexts. In this study, the provincial government implemented a public-private partnership service delivery contract to provide and support digital health infrastructure while ensuring cost certainty. Evidence from this study indicated that a service delivery contract featuring a unitary fee agreement was signed with a private consortium for the provision of non-clinical services. Conversely, the provincial government delivered clinical services.

Figure 2 illustrates the empirical evidence from the current research showing the relationship between the PPP service contract and CDSS success in this context.

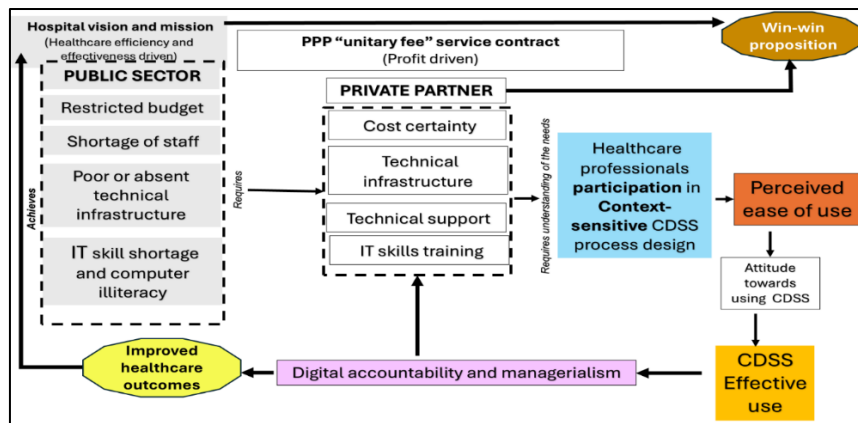


Figure 2: The relationship between PPP and CDSS success

The figure illustrates that hospitals with limited resources benefit from PPP service contracts between the public and private sectors. The PPP contract addresses resource constraints and empowers hospitals to realise their vision and mission of delivering high-quality, accessible, equitable, and cost-effective patient care. The public sector faces financial limitations, staff shortages, gaps in technical infrastructure and IT skills, and issues of computer illiteracy, resulting in poor healthcare outcomes; thus, a PPP contract is necessary. Through a unitary fee PPP service contract, the private partner alleviates these constraints by providing cost certainty, procuring healthcare technical infrastructure such as CDSS, and offering IT training and support to healthcare professionals. The private sector collaborates with healthcare professionals to design and implement a CDSS tailored to local needs, considering contextual factors to make it user-friendly, enhance perceived usefulness, improve user attitudes, and contribute to effective use. The effective use of CDSS enhances healthcare outcomes measured by the business intelligence system, creating a win-win proposition (Sharma, 2023, Kruk and Freedman, 2008). In this respect, a successful win-win proposition in a healthcare PPP involves a balanced arrangement where public and private partners gain value while working towards improving healthcare delivery and outcomes (Sharma, 2023). The current study contributes to knowledge of the role of digital managerial and accountability tools in monitoring the efficiency of private partners, which is linked to financial penalties.

Even though the findings of this research emerge from the hospital level, the findings may be relevant to the South African healthcare sector planning to invest significant financial resources in implementing the NHI bill (Pauw, 2022). Therefore, understanding how the PPP and CDSS success interact has practical implications for hospital leaders planning to invest in CDSS in similar settings. As leaders become aware of internal social or technical challenges and opportunities, they may be able to anticipate which factors are more likely to promote CDSS success, improving clinical outcomes.

Human resource constraints deter PPP investment efficiency

This study reflects an imbalance between the healthcare resources provided by the PPP and human healthcare resources employed by the government. This imbalance limits the full realisation of the benefits of PPP investment. Hospital performance data and interviews reflected that the financing of the PPP contract assumed a hospital occupancy rate of 80%; however, due to a shortage of healthcare professionals, the hospital occupancy rate ranged between 50% and 60%, resulting in wasteful expenditure. Inefficiencies arising from this imbalance negate the potential benefits of PPP, as Kosycarz et al. (2019) described, such as increasing the value for money, maximising the benefits of the public sector, and achieving the social goal. Despite the constraints in healthcare human resources, implementing CDSS facilitated the efficient use of limited healthcare resources. It also improved access to care while reducing costs and waiting times.

Figure 3 illustrates that the PPP overcomes resource limitations, even in staff shortages, using CDSS for clinical care.

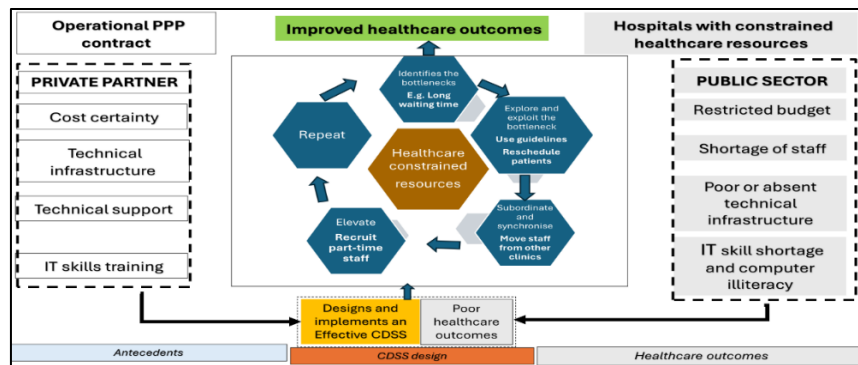


Figure 3: Applying the theory of constraint in resource-limited healthcare settings (Goldratt and Cox, 2016)

Figure 3 provides evidence that the private partner designed and implemented an effective CDSS. The CDSS aids in identifying bottlenecks in hospital operations by facilitating remote access to patient data and performance metrics, enabling managers to intervene by rescheduling patients or reallocating staff from less busy clinics to reduce waiting times where necessary. However, due to a general staff shortage, reallocating personnel serves only as a short-term solution. In addition to addressing human resource constraints, this study provides empirical evidence that CDSS reduces care costs by implementing electronic gatekeeping tools that encourage adherence to cost-effective care, which was not apparent in the systematic review conducted by Grossi et al. (2021). The PPP contract budget provides reliable financial resources for the entire duration of the contract, enabling the private partner to fulfil its contractual obligations and enhance healthcare outcomes. The findings contribute to an understanding of the application of the Theory of Constraints in a healthcare setting and illustrate that public-private partnerships and technological investments enhance clinical care, despite the shortage of healthcare professionals and financial constraints (Goldratt and Cox, 2016, Tortorella et al., 2022). By applying the Theory of Constraints in the hospital, the public and private sectors can leverage CDSS to identify and overcome the most significant bottlenecks in hospital operations. Identifying bottlenecks helps optimise the utilisation of available resources, improve care quality, and create more efficient and responsive clinical operations.

CONCLUSIONS

This research identified that understanding how PPP enhances CDSS success in developing countries is invaluable for the healthcare system. Hospital managers and policymakers could consider these factors when implementing CDSS in resource-constrained environments. Public-private partnerships at the hospital level represent a key strategic resource for designing, implementing, and supporting cost-effective care through CDSS. PPPs also offer cost certainty and alleviate resource constraints by providing reliable technical support and medical equipment, minimising waste while creating a platform for efficient healthcare delivery. While the research originates from the hospital level, the findings could be relevant to the broader South African healthcare sector. PPPs could utilise the insights from this research to establish and implement health information systems, delivering cost-effective care in similar contexts.

The findings and insights regarding the role of digital managerial and accountability tools in monitoring the efficiency of private partners, aligned with financial penalties, could be useful when drafting PPP contractual agreements, ensuring mutual benefits for all healthcare providers while optimising limited healthcare resources. The PPP contractual agreement must be crafted with consideration for the contextual challenges involved. It should incorporate clauses aimed at mitigating these challenges for the mutual benefit of both parties. Furthermore, effective performance management tools and communication platforms should be established to ensure compliance with contractual obligations while allowing for the necessary flexibility influenced by the changing context. Empirical evidence regarding the role of PPP-enabled efficiency underscores the necessity to review contractual obligations and explore alternative payment arrangements linked to resource utilisation, thereby addressing the inefficiencies identified in this research.

Future research directions

While this study evaluated retrospective data, a longitudinal study could provide deeper insights into the key factors contributing to the success of CDSS in similar settings. A study could also be conducted at primary and secondary healthcare levels to assess the relationship between PPP and CDSS success. Accessing financial records and PPP contracts would facilitate a cost-benefit analysis, and future studies should explore strategies to align PPP contractual agreements more effectively.

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TOWNSHIP-BASED FEMALE ENTREPRENEURSHIP: NAVIGATING SOCIAL VALUE AND TRADITIONAL SOCIETAL EXPECTATIONS

Adelaid Margaret Sheik¹

Abstract:

Aims: This study explores the complexities of social value and traditional norms that influence the development and advancement of female-owned microbusinesses in local communities and township areas.

Background: Even with the growing presence of female-owned microbusinesses in local communities and townships, female entrepreneurs continue to face substantial challenges due to persistent gender roles and societal expectations that shape their opportunities and success in the business environment.

Purpose: This research examines the influence of societal perceptions of female entrepreneurs and traditional norms, assessing their role as either barriers or enablers in fostering social value and economic empowerment.

Methodology: This study employs a qualitative research methodology, adopting a phenomenological approach to examine the lived experiences of female entrepreneurs operating micro-businesses in township areas. The data was collected through semi-structured interviews conducted across three townships, and thematic analysis was utilised to identify and interpret key themes.

Findings: The findings underscore the benefits of social value, economic inclusion, and poverty alleviation associated with female entrepreneurship. However, persistent gender inequality, entrenched societal perceptions of female business owners in the local business environment and restrictive traditional gender roles continue to pose significant challenges.

Practical Implications: This research provides practical considerations for female entrepreneurs playing a positive role in societal empowerment and the need for policies to provide more support for female entrepreneurs.

Keywords: Female entrepreneurs; social value; societal expectations; microbusinesses; township businesses.

INTRODUCTION

Despite the growing presence of female-owned enterprises in South African townships, Female entrepreneurs continue to encounter a complex set of obstacles shaped by entrenched gender norms and socio-cultural expectations. These societal pressures often hinder Female's access to essential resources such as financial capital, market linkages, mentorship, and professional networks, all of which are critical to entrepreneurial growth and sustainability (Nambiar, Sutherland & Scheepers, 2024). In many township environments, prevailing expectations around caregiving and household duties restrict Female's time, mobility, and engagement in entrepreneurial activities (Dassah, 2020). Additionally, the dominance of informal economic structures and the scarcity of institutional support heighten the precarity of Female-led businesses, making it difficult for them to scale or formalise.

These gendered challenges are further compounded by historical and structural inequalities embedded in the socio-economic landscape of post-apartheid South Africa. While national frameworks aimed at promoting gender equity exist (Value for Female, 2023), their implementation remains inconsistent at the local level, particularly in marginalised communities. This lack of grassroots support often leaves Female entrepreneurs without the institutional mechanisms needed to counter systemic exclusion (Nambiar, 2020). Despite demonstrating significant resilience and creativity, township-based female operates within entrepreneurial ecosystems (Louw, 2022) that frequently undervalue their contributions and limit sustainable advancement. To address these entrenched disparities, deliberate and context-sensitive interventions are needed—ones that offer not only material support but also challenge the cultural and structural barriers shaping Female's entrepreneurial journeys in the South African context.

The study proceeds with a structured approach: beginning with the literature review, followed by the research methodology, findings, discussion, and implications, and concluding with recommendations for stakeholders in the social economy, including social entrepreneurs, third-sector actors, and educational facilitators.

LITERATURE REVIEW

Using the frameworks of Equality of Opportunity and Endogenous Growth, female entrepreneurship in township contexts is examined as a response to restrictive gender norms, unequal access to resources, and structural barriers. These theoretical perspectives demonstrate that addressing such inequalities not only advances social equity but

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also fosters local innovation and inclusive economic growth by unlocking the underutilized potential of women in marginalized communities.

SOUTH AFRICAN TOWNSHIP ECONOMIES

South Africa's township economies, though predominantly informal, are essential sources of livelihood for millions, particularly among historically marginalized Black communities shaped by apartheid-era spatial and economic exclusion (Nthoana, 2024). These local economies are primarily composed of small-scale, survivalist enterprises that operate within limited geographic and economic boundaries, often recirculating resources internally rather than connecting with broader national or global markets. Despite their marginalization, township economies remain economically and socially significant, offering employment and essential goods and services to underserved populations (Sustainable Livelihoods Foundation, 2024; Pasensie, 2024).

However, township enterprises face a multitude of structural and operational challenges. Chief among these is restricted access to formal financing, as banks and lending institutions frequently view these businesses as high-risk ventures. This perception is compounded by inadequate infrastructure, including erratic electricity supply and poor transportation networks, which further hinder operational capacity and scalability (Mahajan, 2014; Department of Small Business Development, 2019). The informal status of many township businesses also exposes them to regulatory ambiguities and potential harassment, undermining both entrepreneurial confidence and long-term sustainability.

Despite these constraints, township economies exhibit a high degree of diversity and entrepreneurial dynamism. They include a broad spectrum of micro-enterprises embedded in community life, reflecting both economic necessity and cultural resilience. Emerging innovations such as digitally enhanced spaza shops and informal financial mechanisms like stokvels demonstrate the adaptive capabilities of township entrepreneurs (Rai, 2012; Makalima, 2024). These developments highlight the potential for localised innovation to address structural limitations and improve market access, particularly when supported by appropriate technological and community-based solutions.

Realising the full potential of township economies requires targeted, collaborative interventions. A micro-investment ecosystem that leverages local resources, enhances financial inclusion, and formalises informal enterprises is crucial. Moreover, multi-sector partnerships are needed to address systemic challenges such as crime, infrastructural deficits, and socio-economic exclusion. By integrating township economies into broader development strategies, policymakers can reposition these areas from peripheral settlements to central actors in South Africa's pursuit of inclusive and sustainable urban economic growth (Neves & Du Toit, 2012; Scheba & Turok, 2020).

FEMALE-LED TOWNSHIP BUSINESSES

Female entrepreneurs in South African townships face a "double bind" of gendered and structural challenges rooted in socio-economic, cultural, and historical inequalities (Nambiar, Sutherland & Scheepers, 2024;). These include poor infrastructure, limited access to finance and markets, high crime rates, and restrictive societal norms that burden women with caregiving responsibilities, impeding their ability to scale businesses (Khanyile & Ntsobi, 2025). Although many women leverage community networks and informal support systems to sustain their businesses, most remain small-scale and concentrated in low-growth sectors. Intersectional and gender-sensitive interventions—such as tailored mentorship, inclusive communication, and wraparound services—have proven more transformative by addressing both context-specific and gender-related barriers (Nambiar et al., 2024; Schultz, Ebewo & Mmako, 2024).

Financial exclusion remains a key barrier, as formal lenders often perceive female-run township enterprises as high-risk due to lack of collateral and documentation (Khanyile & Ntsobi, 2025; ANDE & Value for Female, 2024). Other barriers, including infrastructural deficits, regulatory uncertainty, and limited digital literacy, compound these difficulties and restrict access to broader markets (Moagi et al., 2021; Canon Collins Trust, 2024; Department of Small Business Development, 2019; World Bank, 2019). Despite this, women entrepreneurs continue to demonstrate resilience through informal financial systems like stokvels. However, unlocking their full potential requires structural reform, including simplified access to capital, targeted skills development, improved infrastructure, and efforts to challenge discriminatory norms that constrain women's entrepreneurial growth (Khanyile & Ntsobi, 2025).

EQUALITY OF OPPORTUNITY THEORY

Equality of Opportunity Theory posits that all individuals should have a fair start in life, where uncontrollable factors such as gender, ethnicity, socioeconomic background, or family circumstances do not dictate their prospects for success. The theory draws a critical distinction between "circumstances" and "effort," suggesting that while

personal effort should determine outcomes, systemic disadvantages arising from one's circumstances require corrective measures. Inequalities are only considered justifiable if they stem from differences in individual effort, not from structural inequalities (Peragine & Ferreira, 2015; European Commission, 2021; Ferreira & Peragine, 2015). This approach underscores the need for public policies that eliminate unfair barriers and promote equitable access to opportunities in education, employment, and economic participation.

Applying Equality of Opportunity to economic inclusion entails actively dismantling the structural and socio-cultural barriers that impede marginalized populations, such as women and township-based entrepreneurs, from fully engaging in economic life. These barriers manifest in various forms—discriminatory labor markets, unequal educational access, limited mobility, and entrenched gender norms—that collectively reduce economic mobility and autonomy for disadvantaged groups (Elford, 2023; European Bank for Reconstruction and Development, 2024). Consequently, promoting equality of opportunity demands intentional, systemic interventions that target both access and outcomes.

Effective implementation requires policies that provide equal access to education and vocational training, facilitate entry into financial systems, and ensure the enforcement of anti-discrimination laws. These measures must be tailored to address the unique challenges facing marginalized groups and must go beyond surface-level reforms to address deep-rooted structural inequalities. By targeting these areas, policies can create enabling environments where individuals can succeed based on merit rather than their socio-demographic backgrounds (European Commission, 2021; Elford, 2023).

Ultimately, equality of opportunity serves not only as a moral imperative but also as a catalyst for broader social and economic benefits. When individuals are empowered to realise their full potential, irrespective of their circumstances, societies benefit from increased productivity, social cohesion, and inclusive growth. As such, the theory provides a foundational framework for designing equitable and sustainable development strategies, particularly in contexts where systemic exclusion remains prevalent (Ferreira & Peragine, 2015; European Bank for Reconstruction and Development, 2024).

ENDOGENOUS GROWTH THEORY

Endogenous Growth Theory asserts that sustained economic growth stems from internal factors such as human capital development, innovation, and knowledge accumulation, rather than from external inputs (Yuan & Zhang, 2024). Pioneered by Paul Romer, the theory highlights the non-rivalrous nature of knowledge and the increasing returns from technological advancements and innovation spillovers (LinkedIn, 2024; World Bank, 2024). This contrasts with traditional models of diminishing returns and emphasizes the importance of policies that invest in education, research and development (R&D), intellectual property protection, and entrepreneurship to drive long-term growth (Ehrlich, Li & Liu, 2017).

For marginalized groups such as female township entrepreneurs in South Africa, inclusive access to education, finance, and technology is essential for meaningful participation in innovation-led growth. Research shows that skills development and knowledge sharing enable individuals to create economic opportunities, fostering both local and national development (Hac & Nguyen Ngoc, 2021; Palani et al., 2025). Policies that integrate human capital development with support for innovation ecosystems—especially in informal economic settings can help unlock the potential of endogenous growth as a pathway to inclusive and sustainable economic transformation (Lloyd-Ellis & Roberts, 2000; Ehrlich, Li & Liu, 2017).

SOCIAL VALUE

Social value refers to the broader positive impact that activities, organisations, or research have on individuals and communities, extending beyond traditional economic outcomes to include social, environmental, and cultural benefits (Social Value UK, 2023; Choi, 2022). It encompasses enhancements in wellbeing, social cohesion, and inclusion, reflecting collective rather than individual interests (Cambridge Handbook of Health Research Regulation, 2023). Social value is achieved when initiatives contribute to public interest, community development, and empowerment, especially among historically marginalised groups, by promoting participation and strengthening social capital (Choi, 2022; Social Value Portal, 2024).

This concept is multidimensional, linking both the societal relevance of an initiative and the measurable outcomes it produces over time (Bornmann, 2013). It requires evaluating the extent to which a programme or intervention addresses community needs while generating lasting improvements in quality of life. Social value thus serves as a critical benchmark in assessing the broader contributions of economic or social initiatives, particularly those targeting vulnerable populations. Its application is especially relevant in development contexts where formal economic metrics fail to capture localised benefits such as community resilience and social inclusion.

Framed by Equality of Opportunity and Endogenous Growth Theory, this research investigates how societal perceptions and traditional gender norms influence the ability of female township entrepreneurs to generate social value and achieve economic empowerment. These theoretical perspectives allow for an analysis of whether cultural attitudes serve as constraints or catalysts in enabling inclusive growth and addressing systemic inequalities. In doing so, the study highlights the intersection between social value creation, gender equity, and sustainable economic development.

RESEARCH METHODOLOGY

Research Design and Approach

This study adopts a qualitative methodology using a single case study design to explore the experiences of female micro-entrepreneurs in South African township settings, with a particular emphasis on social value creation and the influence of traditional societal norms. The research aims to understand how these entrepreneurs navigate cultural expectations while contributing to their communities through their micro-enterprises.

An exploratory approach, as outlined by Saunders and Lewis (2012), is employed to gain in-depth insights into participants' lived experiences, attitudes, and the socio-economic environments in which they operate. Guided by a phenomenological research paradigm, the study focuses on understanding how female entrepreneurs perceive their roles, the value they bring to their communities, and the challenges they face. This approach allows for a nuanced examination of both the structural barriers and the enabling factors that shape their entrepreneurial journeys.

Data Collection Methods

To achieve a comprehensive understanding of the research phenomenon, this study utilised multiple qualitative data collection methods. In-depth, semi-structured interviews were conducted with female micro-entrepreneurs to gather personal narratives and insights into their lived experiences. This format ensured consistency across interviews while allowing flexibility to explore emerging themes. Complementing the individual interviews, focus group discussions provided a platform for collective dialogue, revealing shared challenges, support mechanisms, and perceptions of social value within diverse township communities.

Additionally, non-participant observation of daily business activities offered contextual insights into how micro-enterprises operate in their specific socio-economic environments. Each interview lasted approximately 60 minutes and was conducted in English using open-ended questions to encourage rich, unbiased responses. Informed consent was obtained from all participants, and data were analysed thematically to identify recurring patterns and themes relevant to the intersection of entrepreneurship, social value, and traditional societal expectations (Saunders & Lewis, 2012).

Sampling

This case study focuses on a social enterprise that implements entrepreneurship development programmes for mothers of children with disabilities residing in township areas. The programme supports the establishment of microbusinesses centred on recycling and selling second-hand clothing as a form of income generation. To access participants, purposive convenience sampling was utilised, targeting women enrolled in the entrepreneurship development programme with the support and permission of the director of the social enterprise. The final sample included 30 female entrepreneurs with microbusinesses from four township areas in Gauteng: Alexandra Township, Orange Farm, Diepsloot, and Johannesburg Central Business District (CBD).

Participants were selected based on their direct experience in managing a microbusiness, with inclusion criteria requiring a female entrepreneur with at least one year of business operation, geographic location being a township area, textile recycling with a specific focus on those working within the second-hand clothing sector. The sample size was guided by data saturation, ensuring depth and relevance in the data collected. All businesses involved in the study were informal and maintained a physical presence in their respective township communities (Saunders & Lewis, 2012).

Ethical Approval

Ethical approval for the study was obtained from the Ethics Committee of the Faculty of Business and Economic Sciences, Department of Business Management at the University of Johannesburg. The research followed established ethical guidelines, ensuring voluntary participation and securing informed consent from all participants.

prior to data collection. Confidentiality and anonymity were rigorously maintained throughout the study, in accordance with ethical research standards (Saunders & Lewis, 2012).

Data Analysis Techniques

Thematic analysis was employed to examine the qualitative data, using a systematic approach to review interview transcripts, focus group recordings, and observation notes for the identification of key themes. An inductive coding process enabled the categorisation of data around core topics such as economic inclusion, business growth, and community development. The participants were grouped according to geographic area namely, Alexandra Township (AT), Orange Farm (OF), Diepsloot (DS), and Johannesburg Central Business District (JCDB). As an example, participant 1 for Alexandra Township, as a respondent will be listed as AT1.

Prominent themes that emerged included structural barriers to economic participation, gender-specific challenges, and the importance of community-based support networks.

Ambiguities and overlaps among initial codes were refined to ensure analytical precision and coherence. ATLAS.ti software supported the organisation and coding of the data, enhancing the efficiency and consistency of the analysis. Findings were interpreted in alignment with the study's research objectives.

Findings

The findings highlight the social and economic benefits associated with female entrepreneurship, particularly in the areas of social empowerment, poverty reduction, and economic inclusion. Despite these positive outcomes, significant challenges persist due to entrenched gender inequality, traditional societal perceptions of women in business, and restrictive gender roles. These factors continue to limit women's full participation in entrepreneurial activities within township contexts.

This study contributes to the broader discourse on township economies by underscoring the need for gender-sensitive policy interventions, greater financial inclusion, and improved infrastructure to support female entrepreneurs. Its originality lies in centering women lived experiences, shedding light on their resilience strategies and exposing gaps in existing policy implementation. The research offers practical, evidence-based recommendations for policymakers, investors, and local stakeholders aimed at promoting gender-inclusive economic development.

Viewed through the lens of Equality of Opportunity Theory, the findings reveal that traditional gender roles act as significant barriers to female entrepreneurs' participation and legitimacy in business environments. Structural obstacles, such as limited access to finance, markets, and support networks, further impede their ability to compete equally with male counterparts. These material challenges are often compounded by psychosocial constraints—including low self-confidence, fear of failure, and social stigma which discourage many women from entering or sustaining entrepreneurial ventures.

Table 1: Female entrepreneurship through lens of Equality Opportunity and Endogenous Growth Perspective

Aspect	Equality of Opportunity Perspective	Endogenous Growth Perspective
Social Expectations	Gender roles restrict access and acceptance	Innovation emerges within social constraints
Quotations	Participant OF12: "I feel pressure to conform to societal expectations of female entrepreneurs. Sometimes, people doubt my capabilities because of my gender and age. I have to constantly prove myself, which can be tiring." Participant OF9: "I have faced barriers related to cultural expectations. In my community, women are often discouraged from pursuing entrepreneurship. This societal pressure can make it difficult to gain support from family and friends." Participant OF2: "In townships, opportunities are limited, especially for women. When we empower female entrepreneurs, we are helping to create self-sufficient individuals who can support their families and communities. Women are more likely to reinvest in their businesses and in the community, whether it's through hiring others or supporting local suppliers. This kind of growth benefits everyone."	
Access to Resources	Structural barriers limit finance, markets, and networks	Skill-building and knowledge sharing compensate partially
Quotations	Participant DS1: "I believe the government plays a crucial role in providing financial support through grants and low-interest loans specifically aimed at female entrepreneurs."	

	Participant OF10: "The digital divide has been a challenge for me. I know that having an online presence is crucial, ..." Participant 4: "I've encountered discrimination when applying for loans. Financial institutions often overlook women entrepreneurs, especially in the informal sector. " Participant OF12: "Accessing financial education programs can be difficult. " Participant OF3: "Economic inclusion means empowerment. It allows me to generate income and support my children. Having access to skills training and mentorship would help us make informed business decisions and connect with more customers."	
Psychosocial Challenges	Low confidence, fear of failure, social disapproval	Peer support and mentorship foster resilience
Quotations	Participant DS1: "..., participating in workshops organized by the initiative has improved my business skills and confidence." Participant JCBD3: "Embrace failure as part of the journey. Every setback is an opportunity to learn and grow. Make sure you have a solid business plan but be prepared to pivot if necessary. Building a strong online presence is key in today's digital world." Participant AT1: "My advice is to trust your instincts and go for it! Don't let fear hold you back. Research your market and be clear about your unique value proposition. Surround yourself with mentors and other women who inspire you."	
Economic Potential	Growth	Unequal opportunities reduce participation and scaling
Quotations		Human capital investment drives localized economic growth
	Participant DS4: "I think government policies should actively promote women's entrepreneurship." Participant OF7: "I received support from a government initiative that focuses on empowering female entrepreneurs. This included access to training programs and market opportunities that have helped me improve my business operations and connect with a broader audience." Participant DS5: "Networking opportunities are crucial for female micro-entrepreneurs. The government can organize events and forums where we can meet potential clients, mentors, and other business owners. These connections are vital for business growth and support."	

From an Endogenous Growth perspective, innovation can emerge despite restrictive social conditions, as female entrepreneurs adapt creatively to societal constraints. Limited resource access is mitigated through investments in skills development and knowledge-sharing, which support business growth and local development. Furthermore, peer support and mentorship enhance resilience, enabling women to navigate psychosocial challenges and sustain their entrepreneurial efforts.

DISCUSSION

The application of Equality of Opportunity Theory and the concept of social value in female-led township enterprises reveals the multifaceted challenges and transformative capacity of entrepreneurship in marginalized South African communities. Female entrepreneurs in townships face structural constraints, including limited access to finance, education, and markets, as well as persistent cultural and gender norms that restrict upward mobility (Nambiar, Sutherland & Scheepers, 2024; Khanyile & Ntsobi, 2025). Equality of Opportunity Theory posits that individuals should compete based on merit rather than predetermined social disadvantages (Peragine & Ferreira, 2015). In practice, this necessitates systemic interventions—such as targeted training, inclusive financial services, mentorship, and enabling legal frameworks—to redress inequality and create equitable entrepreneurial ecosystems (ANDE & Value for Female, 2024; DO MORE Foundation, 2024).

Female township entrepreneurs contribute significantly to social value by promoting community resilience, social cohesion, and local economic inclusion. Their businesses often serve dual roles—generating income while addressing pressing social issues, creating jobs, and fostering peer empowerment (Nambiar et al., 2024;

Nieuwenhuizen, 2023). This aligns with the tenets of social entrepreneurship, which emphasize the integration of social impact with economic activities, particularly in historically disadvantaged settings (Li, 2020; Brouard, 2015). Effective support thus requires collaborative, community-driven initiatives that are culturally responsive and holistically designed to maximize both equality of opportunity and social impact (DO MORE Foundation, 2024; Nambiar et al., 2024).

The integration of Equality of Opportunity and Endogenous Growth theories offers a comprehensive framework to understand how female entrepreneurs in townships overcome socio-cultural and economic barriers. While traditional norms and limited institutional support present persistent constraints, these entrepreneurs often rely on human capital investments, knowledge-sharing, and peer networks to innovate and drive sustainable development (Braunerhjelm, Acs, Audretsch & Carlsson, 2010; Ehrlich, Li & Liu, 2017; Kouakou, 2023). Endogenous Growth Theory underscores the centrality of internal drivers—skills, innovation, and entrepreneurship—in economic advancement, especially in contexts with constrained external resources (Audretsch & Fritsch, 2002; Henrekson, Johansson & Karlsson, 2021; Henrekson, Johansson & Karlsson, 2021). These theoretical insights support the design of inclusive policies that move beyond individual interventions to systemic transformation, enabling female entrepreneurs to unlock their full potential and contribute meaningfully to township economies.

PRACTICAL IMPLICATIONS

Supporting female entrepreneurs necessitates a comprehensive, multidimensional approach that integrates both social and economic interventions. Socially, it is vital to foster self-confidence and challenge entrenched gender norms through targeted skills development and psychosocial support. On the economic front, such integrated support mechanisms improve entrepreneurial capabilities by providing scalable, context-sensitive training and increasing access to capital. These interventions also support greater acceptance of female-led enterprises within local markets. Flexible training models and access to networks and financial tools help women transition from survivalist enterprises to sustainable businesses with growth potential.

CONCLUSION

In conclusion, overcoming structural and cultural barriers can be facilitated through various interventions. Furthermore, financial solutions must be tailored to the lived realities of female entrepreneurs, while community engagement initiatives can play a pivotal role in shifting societal attitudes. Multi-stakeholder partnerships enhance both resource mobilization and the legitimacy of interventions, and the provision of wraparound services—such as support for caregiving and mobility—ensures that women are better positioned to engage consistently in entrepreneurial activities.

Ultimately, the combination of holistic support systems, strategic partnerships, and inclusive policies ensures not only the sustained participation of women in entrepreneurship. This dual focus on social empowerment and economic enablement is essential for transforming gendered entrepreneurial ecosystems and advancing inclusive development. As stated by one of the respondents, "I hope for a future where my daughter and her friends grow up in an environment that values and supports female entrepreneurship..."

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SOCIAL INNOVATION IN TEXTILE RECYCLING: AN ASSET-BASED COMMUNITY DEVELOPMENT AN APPROACH TO INCLUSION

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Abstract:

Aims: This study examines the innovative approach adopted by a textile recycling social enterprise in fostering female microbusinesses for economic inclusion, within local communities in Johannesburg Gauteng, South Africa.

Background: Informal micro-businesses serve as critical drivers of economic inclusion, particularly in communities affected by systemic inequalities and high unemployment rates. In response to these challenges, the social enterprise employs an Asset-Based Community Development (ABCD) approach, by developing social capital, to establish and support informal female micro-enterprises through a textile recycling initiative.

Purpose: The research investigates the influence of social entrepreneurial transformative leadership initiatives that employ innovative strategies integrating asset-based community development participatory approaches to build social capital within the textile recycling industry, promoting the inclusion of previously marginalised women.

Methodology: This study adopts a qualitative research methodology, utilising a case study design to explore the experiences of female entrepreneurs in micro-businesses engaged in textile recycling within four township areas. Data collection was conducted through semi-structured interviews and focus groups, with thematic analysis employed to identify key insights.

Findings: The findings highlight the significant potential of leveraging locally available assets to mitigate the economic disenfranchisement of women and promote inclusive economic development. Additionally, the study underscores the role of textile recycling in advancing sustainable community-driven solutions.

Practical Implications: This research provides practical recommendations for community development initiatives and development organisations aiming to create inclusive economic environments that support female entrepreneurship. Furthermore, the study highlights transformative leadership acts as a catalyst in mobilising community assets and social capital toward effective social innovation in textile recycling.

Keywords: social innovation, social enterprise, microbusiness, female entrepreneurship, Asset-Based Community Development (ABCD), economic inclusion, recycling and social capital

INTRODUCTION

Textile recycling is recognised for the sustainable and positive impact, environmentally, socially and economically contributing to inclusive economies (Alonso-Muñoz, González-Sánchez, Siligardi & García-Muiña, 2022; Staicu, 2019, May).). When utilising existing assets driving sustainable social and environmental innovation (Krysovaty, Ptashchenko, Kurtsev & Ovagim, 2024) by designing solutions by addressing wicked problems (Sheik, Tselepis & Reddy, 2023). Asset-based Community Development (ABCD) is a participatory model used for local community development (Qiaoyu, Rosnon, Amin, et. al, 2024). In textile recycling, this means recognising the knowledge, labor, informal networks, and cultural practices within communities (Febriani & Haque, 2024; Baroque-Ramos, Amaral, Laktim, et. al., 2017), especially marginalised groups such as women in townships or informal settings (Khumalo, Patnaik & Chisin, 2025; Etim & Iwu, 2019). Social entrepreneurs combine organisational strategies, utilising community development approaches with the aim of building social capital.

Building social capital explains how trust, networks, and norms of reciprocity within communities enable cooperation and collective problem-solving (Kreuter & Lezin, 2002; Bridger & Alter, 2006). In the domain of social entrepreneurship, these relational assets are essential for mobilising community participation, fostering trust, and facilitating the exchange of knowledge and resources. When social entrepreneurs leverage social capital, they are better positioned to build inclusive, collaborative networks that enhance the impact of their initiatives (Hernandez & Berardi, 2024). Particularly in underserved or marginalised communities, where formal institutions may be weak or absent, social capital becomes a crucial mechanism for enabling bottom-up innovation and collective action (Putnam, 2000; Glaeser, 2001). In textile recycling, strong social capital facilitates coordination among collectors, recyclers, consumers, and institutions, reducing transaction costs and enabling knowledge sharing (Beck & Purcell, 2020; Collver, 2013). The continued development of social capital plays a critical role in the success and sustainability of social entrepreneurship, with the influence of transformative leadership.

This study seeks to explore social entrepreneurial transformative leadership initiatives that employ innovative strategies integrating asset-based community development participatory approaches and foster the development of social capital within the textile recycling industry, focused on promoting the inclusion of previously marginalised women. The following sequence is applied throughout the study: literature review, research methodology, results,

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discussion, contributions and implications, and finally, the conclusion. Lastly, recommendations are proposed to key stakeholders, including policymakers to promote inclusive policies, social entrepreneurs to drive social innovation, and supporting actors such as institutions and intermediaries like mentors.

LITERATURE REVIEW

The concepts of textile recycling in social enterprises, social innovation, social capital and the Asset-based Community Development (ABCD) model is shared in this section.

Social Innovation in textile recycling

Social innovation in textile recycling refers to new strategies, concepts, and organisational forms that address social, economic, and environmental challenges (Griffiths, Gundry, & Kickul, 2013) in the textile sector by promoting sustainable practices, community engagement, and inclusive economic development. Social enterprises play a pivotal role in advancing social innovation (Sheik, 2022) within textile recycling by operationalising the waste hierarchy and proximity principle through localised collection, sorting, repair, resale, and upcycling activities (Wu, Zhuang, Zhang, Zhao, 2022). Furthermore, the lifecycle of textile products is prolonged but also generates significant socio-economic benefits, such as job creation—estimated at 20 to 35 jobs per 1,000 tons of textiles processed—and the delivery of circular economy skills to marginalised and vulnerable populations, thereby fostering community resilience and supporting those at risk of socio-economic exclusion (Leal Filho et al., 2019).

Furthermore, social innovation in textile recycling is characterised by strong community engagement, skills development, and an emphasis on inclusivity, particularly gender-responsive approaches that enhance women's participation in the sector. Systems-based and regionally tailored initiatives demonstrate the effectiveness of multi-stakeholder collaboration in establishing circular supply chains, creating local employment, and adapting solutions to specific community needs. Collectively, these socially innovative models contribute to environmental sustainability, social inclusion, and economic development.

Textile recycling in microbusinesses.

Textile recycling microbusinesses represent a vital pathway for women's socio-economic empowerment, especially in regions burdened by textile waste and production. These enterprises enable women to generate income and achieve financial independence by transforming textile waste into valuable products (**Febriani & Haque, 2024**), thereby aligning economic activities with environmental sustainability. Through targeted training and access to gender-inclusive technologies, women acquire essential skills that enhance their productivity and entrepreneurial capacity, contributing to both personal advancement and broader community development.

Moreover, these microbusinesses foster social inclusion by promoting collaboration among women (Clube & Tennant, 2022), in cooperatives, NGOs, and government entities, strengthening social capital and ensuring the sustainability of recycling initiatives. They also embody circular economy principles by reducing textile waste and supporting local environmental conservation efforts. However, women entrepreneurs face significant challenges, including limited financial access, socio-cultural barriers, and insufficient policy support, necessitating comprehensive interventions such as financial inclusion programs, education, and infrastructure development to fully realise their potential.

Transformative Leadership harnessing social capital

Transformative leadership is a leadership style that emphasises inspiring and motivating followers to transcend their self-interests for the collective good by fostering a shared vision, intellectual stimulation, and individualised support (Bass & Riggio, 2006). Unlike traditional transactional leadership, transformative leaders engage followers through emotional intelligence, empathy, and participatory decision-making, creating a culture of trust and collaboration that drives sustained organisational change and enhanced performance (Rodriguez, Green, Sun & Baggerly-Hinojosa, 2017).

Social capital is a network of relationships, trust, and norms within a community, plays a crucial role in amplifying the effectiveness of transformative leadership by facilitating cooperation, knowledge sharing, and collective action (Lin, 2001; Beck & Purcell, 2020). Transformative leaders leverage social capital to bridge gaps between diverse stakeholders, fostering inclusive environments where followers feel valued and empowered to contribute meaningfully to shared goals. By harnessing social capital, these leaders reduce transaction costs, build informal support systems, and stimulate peer learning, which enhances innovation and resilience within organisations and communities (Muralidharan & Pathak, 2018). This synergy between transformative leadership and social capital

is essential for driving equitable and sustainable outcomes across complex social and organisational contexts (Collver, 2013). The Asset-Based Community Development (ABCD) approach is one such participatory approach applied by social entrepreneurial leaders.

Kretzmann and McKnight (1993) pioneered the Asset-Based Community Development (ABCD) approach, which shifts focus from community deficits to identifying and mobilising existing local assets—individuals, associations, and institutions to foster sustainable social and economic development through inside-out strategies and collaborative partnerships. Building on this foundation, Biscotti and Mouchrek (2020) apply ABCD within higher education leadership, advocating for a strengths-based framework that encourages institutional leaders and stakeholders to recognise and leverage internal capacities and social capital. Their work highlights how participatory, asset-focused leadership fosters shared ownership and agency across diverse campus groups, enabling more inclusive, adaptive, and sustainable institutional change. Together, these perspectives underscore ABCD's transformative potential in both community and academic contexts by promoting empowerment, resilience, and systemic change through the strategic activation of existing assets and collaborative networks (Mathie & Cunningham, 2003).

This study seeks to apply the adapted ABCD model used by Biscotti and Mouchrek (2020) in higher education to a textile recycling social enterprise environment. The objective of this study is to investigate how social entrepreneurial transformative leadership initiatives, utilise ABCD participatory strategies to build social capital and enhance the inclusion of marginalised women in the textile recycling industry. The research question is how do transformative leadership initiatives in social entrepreneurship incorporate asset-based community development approaches, build social capital and facilitate the inclusion of marginalised women within the textile recycling sector?

RESEARCH METHODOLOGY

A qualitative approach was applied, as it allows for deeper insights to be garnered from specific settings (Denzin & Lincoln, 2018). The researcher used a single case study (Creswell, 2013), applying an interpretivist method, investigating the phenomenon of social and economic inclusion of female micro-entrepreneurs.

Background of the Case Study

The case study is unique in that it brought two social entrepreneurial leaders together, one previously with a clothing recycling business and the other with a non-profit organisation for disabled youth. The entrepreneurs combined efforts to form a partnership within a social enterprise to uplift both youth with disabilities as well as parents of the youth with disabilities. The organisation was established 13 years ago, in Gauteng, South Africa and has benefited over one hundred female microbusinesses in township areas. The aim of the social enterprise is to recycle several tons of previously loved clothes per year through textile recycling, upcycling and downcycling, facilitating the social intent of upskilling youth with disabilities as the primary beneficiaries and furthermore has an entrepreneurial development programme for the mothers of the youth with disabilities.

Research design and sampling

The unit of analysis was conducted at organisational level, investigating leadership activities through the lens of the Asset Based Community Development (ABCD) model, and what processes led to the inclusion and empowerment of several female microbusiness beneficiaries within an entrepreneurial development programme. The study specifically focused on social innovation in textile recycling, and therefore selected a single case study, a clothing recycling social enterprise in Gauteng, South Africa. Purposive convenience sampling was applied (Cohen & Manion 1994). Included in the sample were the founding directors of the organisation and the females directly benefiting from the entrepreneurial programme, also known as the mothers of the youth with disabilities. Individuals excluded were any other operational staff members in the organisation and any mothers in the development programme for less than 6 months.

Data collection

Furthermore, two separate semi-structured interviews (Denzin & Lincoln, 2018) were conducted with each of the founding directors, and focus groups were used to gather information from the female micro-entrepreneurs. The interviews took place at the organisation's office for approximately sixty minutes in each interview and forty-five minutes in the group sessions (Guest, Bunce & Johnson, 2006), some inside a meeting room and others outside on the property in a safe environment. The participant names were reflected as follows, the directors were named

Director A and Director B, and the participants were from four township areas namely, Diepsloot (GP), Orange Farm (GO), Johannesburg Central (GJ), and Alexandra Township (GA). Each participant signed a consent form and participated voluntarily. The researcher ensured that all ethical processes and Protection of Personal Information Act (POPI Act) (POPIA, 2019) were adhered too.

Data analysis

Content analysis was suitable means to investigate the phenomena in the case study. A two-phased content analysis approach was utilised, applying the adapted ABCD model used by Biscotti and Mouchrek (2020), which was adapted to include the influence of leadership in this conceptual approach, refer to Figure 1.



Figure 1. 5-Step ABCD adapted model developed by Biscotti and Mouchrek (2020), mapped for the Textile Recycling Social Enterprise Case Study

The first phase was using predetermined themes guided by the five-step ABCD conceptual model elements namely, mapping assets, building relationships, mobilising and information sharing, convene the community and stakeholders to create a vision, and finally to leverage resources. The second phase was investigating if the leadership influence was significant in creating socio-economic inclusion for the female entrepreneurs with microbusiness in this case, mainly focusing on the following leadership elements, namely, engage, evaluate, equalise, educate, empower and finally encourage. Furthermore, the utilisation of ATLAS.ti, a computer-assisted qualitative data analysis software tool facilitated the analysis of the data throughout. The coding exercise helped to determine if the predetermined themes were apparent in the case study.

FINDINGS

The findings show notable inclusion of previously marginalised groups namely the disabled youth and the previously disenfranchised mothers of the youth, were socially and economically empowered. Focusing on the mothers of the youth with disabilities, they were included in a successful entrepreneurial development microbusiness programme, which helped them to become self-sustaining.

Director B explained, “... but if they [the community/ beneficiaries] are actually contributing toward the service, they tend to take care or take ownership of that and they ensure that even the future generation can benefit...”

Director A highlighted that, “... a social enterprise... should be in touch with the people its serving. It's very important because you can serve people if you don't know their needs, if you don't actually know them at all.

Forming part of the organisational process, the findings show that the social enterprise leaders, utilised the five-step ABCD mode, although they were unaware of the model at the time and inception of the social enterprise. When the social enterprise leaders came into the partnership, they did an internal assessment of the assets each party brought into the new formed social enterprise. As part of the internal mapping exercise, Director A contributed a house at which the recycling took place and the network of contributors of tons of previously loved clothes. Director B had an establish list of service providers in the disability sector, and a list of youth already in an upskilling programme with a database with information the details of the parents of the youth with disabilities. Director A exclaimed, “Yes we have 6 of them [sorters] and then we have contractors... sales team which is 4 people and one in logistics”.

The external mapping included a consolidation of networks, stakeholders and funders which formed part of *building relationships* as they rebranded under the name of the newly formed social enterprise. Followed, by mobilising and information sharing of the new social innovation and strategy utilising textile recycling to benefit people with disabilities and their affected families. The community are the beneficiaries namely, people with disabilities, network of stakeholders, service providers, contributors of previously loved clothes both in the public and private sector and institutions, as participants in the textile recycling, upcycling and downcycling textile value chain. The intension of the developing the value chain was engage and to convene stakeholders at different times and levels to assist the organisation to support the new social enterprise vision. Over time, the textile recycling organisation *leveraged resources* and initially started with clothes recycling through reselling to township communities. The mothers of the children with disabilities were resident in the townships targeted local markets for the recycled clothes, this generated the mainstream income for the social enterprise, but it also assisted the mothers of children with disabilities to become economically active and self-sustained through setting up of the textile recycling microbusinesses. The social enterprise also created jobs for the mothers, they created products such as toys for children with disabilities from clothes that could no longer be used through a downcycling process. Director A enthusiastically explains, “*[The international retailer] is such a forward-thinking company worldwide, they are encouraging you to bring any clothes, it doesn’t have to be their branded clothes, so that they close the loop and it goes back to us [the organisation].*”

Furthermore, considering the transformative leadership influence as a catalyst for the development and inclusion of previously marginalised groups, namely focused on the following elements: engage, evaluate, equalise, educate, empower and finally to encourage. The directors of the social enterprise clearly identified the community of beneficiaries and the township areas they were going to *engage* with, which was people with disabilities and the affected families.

Director B, *proudly comments*, “*we now have 4 people with disabilities working at [the International Retailer] and I look at them and I'm thinking, that's how it should be*”.

Next, in each township an *evaluation* was conducted in each township area to determine how many people there were with disabilities and negative impact - professionals such as social workers were used to assist with the evaluation.

As as expressed by Director B, “*...but I've always felt like doing good is also important*”.

Once they identified the number of people with disabilities affected in the specific township areas, they created a community of beneficiaries to form part of the entrepreneurship development programme offered by the social enterprise. Some of the beneficiaries became part of the initial founding team and assisted new beneficiaries as they entered the development programmes. As part of educating the beneficiaries, in the case of the mothers of youth with disabilities, they entered the entrepreneurial programme.

GJ6 - Participant 6 explained, “I have encountered a lack of support and mentorship in my journey. While there are initiatives aimed at helping women entrepreneurs, they are often limited. Without guidance, it’s challenging to navigate the complexities of running a business and accessing economic opportunities.”

These programmes offer financial literacy, sales training, business support, and ongoing mentorship, equipping women with the skills needed to run and grow their ventures successfully.

Director B explained, “*... for me, it has always been dignity and hope ... the thing about the Organisation, is empowerment. I'm not going to give you anything, I am going to empower you. So that you can be the best mother you can be for your children*”.

GJ3 - Participant 3 elaborated, “I struggled with financial literacy for a long time. I didn’t know how to manage my profits or reinvest in my business. This lack of knowledge made it difficult for me to grow. I’ve since sought help, but it was a significant hurdle in the beginning.”

In turn, the more established female micro- business owners were included as part of the training team to teach to share best practices and how best the selling of the clothes could be done in the local communities. The social enterprise leaders *empowered* the mothers of the youth reported financial independence and being able to take care of their families.

Director A highlighted, “*Our micro businesses, are doing better and better and better. Right, a lot of them get a grant for their child and plus a lot of them have microbusinesses so they move forward with a much higher pace...*”

The social enterprise leaders' ultimate *encourages* self-sufficiency and a better future for their beneficiaries. Director A explained, "*Because they [mother's] get enough money, you know ...they get 30 bails, selling for R30 000 - 40 000 rand a month.*"

As proudly stated by Director B, "*I think within a year from now and maybe this is hoping speaking, but I love hope. Is that the Organisation will not be dependent on any funding from outside...*"

The findings indicate significant social and economic empowerment among previously marginalised groups, specifically youth with disabilities and their mothers specific to the textile recycling social enterprise. The youth benefited from targeted technical training in textile recycling, which facilitated their subsequent placement in private sector employment. Concurrently, mothers of youth with disabilities participated in a successful entrepreneurial development microbusiness program, enabling them to achieve self-sufficiency.

The study further reveals that social enterprise leaders, albeit unintentionally, implemented the five-step Asset-Based Community Development (ABCD) model during the establishment of the enterprise. Upon forming the partnership, an internal asset mapping exercise was conducted: Director A contributed physical space for recycling activities and a network of clothing donors, while Director B brought established connections within the disability sector and access to a database of young people and their families. External asset mapping consolidated networks, stakeholders, and funders contributed by both directors, facilitating relationship-building and the rebranding of the enterprise. Subsequent efforts focused on mobilising resources and disseminating information about the new social innovation, which leveraged textile recycling to support people with disabilities and their families.

Director B explains "*... as I said before, it's kind of organically happened because ... had a vision for business, I had a vision for disability. He didn't have the knowledge of [people with] disability, I did not have knowledge of business...So I think we are a good team because, I have that [a] very strong vision in terms of [people with] disability...*"

The primary beneficiaries included people with disabilities, their families, relevant stakeholders, service providers, and contributors from both the public and private sectors, all of whom participated in the textile recycling, upcycling, and downcycling value chain. The strategic development of this value chain involved engaging stakeholders at various levels to support the enterprise's vision. Initially, the organisation generated income by reselling recycled clothing in township communities, where mothers of youth with disabilities resided. This not only provided a sustainable revenue stream but also empowered these women to become economically active through the establishment of their own microbusinesses.

G01 - Participant 1 highlighted that, "Running my second-hand clothing store has taught me valuable skills in sourcing and evaluating inventory. I've become adept at identifying quality pieces and understanding fashion trends. Additionally, my negotiation skills have improved significantly when dealing with suppliers and customers."

Additionally, the enterprise created employment opportunities by facilitating the production of goods, such as toys for children with disabilities, from downcycled textiles.

Leadership played a pivotal role as a catalyst for the inclusion and development of marginalised groups, following a process of engagement, evaluation, equalisation, education, empowerment, and encouragement.

Director A excitedly shared, the "*money, is coming ... the recycling company with micro businesses buying bails and selling [recycled] clothes*" as well as grants and donations, as detailed, "*[donation] to [the non-profit]...40% of it is going here and others is being donated*".

GD4 - Participant 4 explained, "*I grew up in a culture that valued reusing and recycling. Starting my secondhand clothing business allowed me to honor those values while also providing a sustainable alternative to fast fashion. It's fulfilling to help others shop mindfully.*"

The directors systematically identified target communities—primarily people with disabilities and their families in township areas—and conducted evaluations, often with the assistance of social workers, to assess the needs and impact. Beneficiaries were integrated into development programs, with joining the founding team and later supporting new participants. The youth underwent individualised upskilling programs, while mothers received comprehensive entrepreneurial training, including financial literacy, sales, business support, and mentorship. Previously equipped female microbusiness owners came in as mentors and contributed to training efforts, sharing best practices in local markets.

Director A explained, "*... but if they [the community/ beneficiaries] are actually contributing toward the service, they tend to take care or take ownership of that and they ensure that even the future generation can benefit...*"

GA1 - Participant 1 expressed: *"I was inspired to start my secondhand clothing business after attending a workshop on sustainability. I wanted to make a positive impact on the environment while helping people find unique styles at affordable prices."*

Through these initiatives, youth with disabilities acquired technical skills and employment, and mothers reported increased financial independence and improved family well-being. The leadership of the social enterprise fostered self-sufficiency and enhanced prospects for all beneficiaries.

The *"parents of the kids with disabilities, those parents get to self-actualise, they get to become self-sustainable"* as mentioned by co-founder CGK02

GD9 - Participant 9 enthusiastically shared, "Economic inclusion is about creating pathways for success. It allows women in our community to establish and grow their businesses. Access to suppliers and markets is crucial for us to thrive and contribute to the local economy."

LIMITATIONS

Although single case studies are acceptable in qualitative research, the number of research participants are limited and with the geographic location limited to one province in South Africa could also be considered narrow.

DISCUSSION

Social entrepreneurs who embraced transformative leadership played a pivotal role in driving community development, fostering social capital, and promoting socio-economic advancement for women previously been marginalised. By leveraging textile recycling initiatives, these social entrepreneurial leaders empowered women, helping them develop valuable skills, entrepreneurial abilities, and greater self-reliance.

Furthermore, the textile recycling microbusinesses significantly advanced women's economic empowerment by providing income-generating opportunities, particularly for those facing barriers to formal employment, such as mothers of children with disabilities. Furthermore, the social enterprise entrepreneurial initiative equipped the women with entrepreneurial skills and business support, fostering financial independence and enabling them to improve their families' living standards. Additionally, such microbusinesses stimulate local economies by creating further employment opportunities. Additionally, including women affected by disability related stigmas, thereby challenging exclusionary norms and promoting greater workforce inclusivity.

From a social perspective, textile recycling microbusinesses facilitate the inclusion of marginalised women, reducing their social isolation and enhancing their participation in community life. Engagement in these enterprises helps women build supportive networks, increasing their confidence and collective agency. Also, by contributing to environmental sustainability, women in textile recycling develop a sense of pride and social identity. Successful entrepreneurs in this sector also serve as role models, inspiring broader community empowerment and reinforcing positive social change.

In textile recycling, embedding social capital within entrepreneurial initiatives enhances coordination and participation in waste management by fostering trust and reciprocity among stakeholders such as waste pickers, recyclers, NGOs, and consumers. This social cohesion reduces transaction costs, facilitates peer learning, and supports cooperative structures that improve efficiency and innovation. Additionally, strong social capital empowers social entrepreneurs to mediate between grassroots actors and formal institutions, thereby shaping policies and markets toward a more equitable and sustainable outcome. Furthermore, textile recycling microbusinesses empower women economically and socially through income generation, skill development, community engagement, and environmental sustainability, while connecting to existing social capital.

THEORETICAL CONTRIBUTION AND IMPLICATIONS

This study advances theories of economic inclusion by demonstrating a combination of Asset-Based Community Development (ABCD) practices and leadership influence could empower female entrepreneurs to overcome socio-economic and the stigma of disability-related barriers. The findings also contribute to participatory and leadership theories by highlighting the positive effects of inclusive initiatives in marginalised socio-economic contexts, thereby reinforcing the importance of targeted leadership initiatives in promoting social inclusion.

The research further enriches social entrepreneurship theory by illustrating how strategic partnerships and social innovation generate dynamic, sustainable outcomes in resource-constrained township environments. It also demonstrates key strategies employed by township entrepreneurs, such as leveraging informal networks, practicing

creative resource management, and maintaining business flexibility. Importantly, the study underscores the need to address disability and gender biases to cultivate a more inclusive entrepreneurial ecosystem.

CONCLUSION

In conclusion, this study contributes to the literature on transformative leadership, community participatory approaches and social entrepreneurship by revealing the multifaceted socio-economic impacts of township-based textile recycling microbusinesses. These microbusinesses serve not only as income sources but also as catalysts for community empowerment, positive social impact and localised economic growth. As one participant apply expressed, ‘...economic inclusion is about creating pathways for successes. The findings emphasise that economic inclusion initiatives targeting marginalised women extend benefits beyond individual success to improve family welfare and community stability. Consequently, the study offers valuable policy implications, advocating for equity-driven economic interventions that support disenfranchised female entrepreneurs affected by stigmas related to disabilities in emerging township economies.

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DIGITAL TWIN FRAMEWORK FOR LIKA-SENJ: SIMPLE MODEL TO TEST TECHNOLOGY AND POLICY FOR RURAL AREAS DEVELOPMENT

Raffaella Folgieri¹

Abstract:

This study presents a proof-of-concept digital twin framework designed to demonstrate how a simplified prototype can serve as a viable tool for ex-ante cost-benefit evaluation of digital interventions in rural areas, using Lika-Senj (Croatia) rural area as a test case. By integrating Agent-Based Modelling (ABM), System Dynamics (SD), and Geospatial Optimization (GO), the framework simulates the interplay between micro-level stakeholder decisions and macro-scale socio-economic outcomes, focusing on two technologies: Non-Fungible Tokens (NFTs) for artisan income diversification and Augmented Reality (AR) for tourism redistribution.

The model results indicate that NFT adoption could increase farmers' and artisans' incomes by 25% ($p < 0.01$), while AR interventions may extend tourist seasons by six weeks, redistributing demand (+28% winter attendance). Spatial optimization identified Gospić and Otočac as optimal hubs for AR deployment, covering 95% of cultural sites under EU Smart Villages accessibility thresholds. These results validate the model against historical data (2015–2023, $R^2 > 0.82$) and demonstrate alignment with empirical studies, though synthetic data limitations necessitate cautious interpretation. In this light, the primary contribution lies not in the absolute metrics but in demonstrating that a lightweight, modular prototype can effectively guide policy prioritization, particularly for digital solutions (e.g., NFTs, AR) in resource-constrained settings. For instance, geospatial optimization identified Gospić and Otočac as optimal AR deployment hubs, aligning with real-world infrastructure constraints. While the model omits some behavioural complexities (e.g., cultural resistance), its design ensures adaptability to richer datasets and additional agents in future iterations.

The study argues that such frameworks, even in their nascent stages, can mitigate investment risks by quantifying trade-offs before implementation—addressing a critical gap in rural policymaking. Future work should expand stakeholder-specific agents and integrate participatory validation, but this prototype establishes a replicable foundation for evidence-based intervention testing.

Keywords: digital twin, rural development, agent-based modelling, policy testing, sustainability

INTRODUCTION

Rural regions across Europe face, in general, the problem of economic stagnation and demographic decline, also due to infrastructural marginalization, sometimes despite their natural assets jointly with valuable cultural heritage (Rodríguez-Pose, 2018). Lika-Senj can be considered an example of this scenario. In fact, the Croatian county includes UNESCO-protected landscapes (such as Plitvice Lakes National Park), but since 2011, the region has experienced population decline (around 4%, Eurostat, 2024) and an unemployment rate around 18% (Eurostat, 2023), developing an overdependence on seasonal tourism (Državni zavod za statistiku, 2024). To overcome these trends, some initiatives worked on local assets to lead rural revitalisation. A virtuous example is given by the project *Lika Quality*, a certification system aimed at certifying local product quality. The project boosted agro-food revenues by 20% through brand differentiation (Ostojić et al., 2024). Aside from local initiatives, some indications on best practices can be derived from the EU's Smart Villages Initiative, where place-based innovation are analysed and proposed to create new opportunities in peripheral regions (The European Network for Rural Development (ENRD) - European Commission, n.d.). However, a big financial effort is needed to realign rural economies and demographics, considering that the major cost is represented by investments in infrastructures (digital and not) making difficult the decision-making process without a guarantee of the success of the intervention.

In the presented scenario, also emerging digital technologies could provide a significant contribution to boost local economies because of their low-cost implementation and great potential. For example, two very discussed technologies, namely Non-Fungible Tokens (NFTs) and Augmented Reality (AR), offer further means to enhance rural resilience. Blockchain-based NFTs have proven particularly effective in the field of traditional craftsmanship, as they facilitate access to global markets for artisanal products (Malik et al., 2022). As for Augmented Reality, some scholars have shown that tourism experiences developed through this technology can redistribute seasonal tourist demand by up to 30% (Prodinger & Neuhofer, 2023). However, literature often fails to consider these two technologies in synergy, thereby overlooking their combined impact. A multi-technology intervention, on the other hand, could be extremely promising, especially in complex areas such as rural regions. In these contexts, however, the main limitations are infrastructural deficits, such as the lack of broadband coverage and a low propensity to

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adopt cutting-edge technologies (often due to the higher average age of the population). These factors significantly increase the risk of failure for such initiatives and discourage policymakers from investing capital in the absence of clear forecasts regarding the effectiveness of the proposed actions (Wu et al., 2023).

This preliminary paper aims at addressing these concerns, through the proposal of creating a digital twin model of a rural area to test in advance a possible intervention as a decision-making tool. The test was conducted on the region of Lika-Senj, given the disposal of data from the European Commission, Lika Quality project (Lika destination, 2020) and the Croatian Bureau of Statistics (web.dzs.hr, n.d.). The framework represents a basic model which, although it should be further expanded for real-world application, offers a preliminary view of how the combination of Agent-Based Modeling (ABM), System Dynamics (SD), and Geospatial Optimization can provide a tool for simulating the socio-economic and environmental impact of digital projects, thereby offering insights for subsequent real-life implementation. ABM is particularly well-suited for capturing micro-level decision-making processes—such as, in this study, the adoption of NFTs by farmers or the choice of tourists to engage in AR-based experiences—based on findings from behavioral econometrics (Cisilino & Monteleone, 2020). More broadly, SD models offer a macro-scale perspective on how tourism revenue could stimulate investment in digital infrastructure (Serman, 2002), while Geospatial Optimization supports the design of infrastructural interventions that comply with economic and environmental constraints (Anselin and Rey, 2014). The model presented here is a simplified version for experimental purposes, but it aims to illustrate how the described components can interact to provide a useful decision-making tool.

The research question that motivated this study was formulated as follows:

Can an integrated Agent-Based Modeling System (ABMS), augmented with System Dynamics (SD) and Geospatial Optimization (GO), serve as a simulation tool to prioritize interventions—maximizing cost-benefit ratios within local resource constraints—for policymakers?

To this end, indicators provided by the EU Smart Villages indicators project, as well as historical data (2015–2023), were utilized to validate the simulations, ensuring that the model, albeit simplified, could serve as a proof-of-concept of its utility for policymakers. Also, the study has been limited to NFTs and AR, given prior experiences of the author. The preliminary results suggest that NFTs can increase farmers' revenue by 25% ($p < 0.01$) and that the adoption of AR to expand tourism offerings can extend seasonality by approximately six weeks. These findings align with the Digital Europe Programme (European Commission, 2021). However, it is important to acknowledge the limitations of the study, which presents a simplified model that would benefit from expansion with additional agents and more complex data. Furthermore, the study mentions, but does not incorporate into the model, the limitations due to plausible digital literacy needs of the population involved.

This research contributes to the emerging field of study concerning the digital future of rural areas, providing a replicable and expandable methodology for evaluating the balance between technological promises and actual conditions. In the following sections, the first part presents a literature review of studies related to the examined topic; section two outlines the adopted methodology and implemented framework; the third section demonstrates the results of applying the framework to an area in Lika-Senj County (specifically Gospić, Otočac); the fourth discusses its outcomes. The document concludes with final considerations and hypotheses for subsequent developments.

LITERATURE REVIEW

The literature review analyzes three foundational themes underlying the presented model: the issue of rural area development, the potential application of digital innovation in such areas, and the utility of the "digital twins" model for policy testing. The literature analysis was conducted drawing from Scopus, Web of Science, and EU policy repositories. Keywords used for the search included "rural digitalization," "NFTs in agriculture," "AR tourism," and "digital twins for policy." Articles were selected based on relevance, peer-reviewed status, and publication date (2000–2023). The literature review served not only to provide theoretical consistency to this study but also to identify gaps that the study itself could address.

In the field of rural development research, scholars emphasize the necessity of valorizing local assets such as cultural heritage, territorial amenities, and local products, as they represent the backbone for economic resilience (Stam, 2015; Rodríguez-Pose, 2018). In the case of Lika, for instance, the *Lika Quality* initiative enabled a 20% increase in agro-food revenues through brand differentiation (Lika Destination, 2020), providing an excellent example of how the specificity of local products can constitute a unique resource to counteract economic precariousness in peripheral areas. The literature also reveals that traditional approaches often fail to offer solutions for equally serious problems affecting peripheral areas, such as depopulation, low demographic attractiveness, and infrastructural deficits (Capello & Lenzi, 2019). These latter points are well highlighted in the EU's Smart Villages Initiative, which emphasizes the necessity of place-based strategies that also include plans for the digitalization of peripheral areas (The European Network for Rural Development (ENRD) - European Commission, n.d.).

Although NFTs have proven useful in facilitating entry into the block-local market (Malik et al., 2022) and AR has demonstrated interesting potential in extending visits by up to 30% beyond canonical tourist seasons (Prodinger

& Neuhofer, 2023), digital innovation encounters significant barriers in rural regions (Wu et al., 2023). Indeed, infrastructural problems, particularly concerning broadband connectivity and digital literacy (Wu et al., 2023), represent obstacles to the introduction of advanced technologies in these areas.

Within the described framework, the necessity to simulate the effectiveness of possible digitalization interventions introduces the potential utilization of Digital Twins. Primarily and initially adopted in industrial and urban contexts (Malik & Ahmad, 2021), such models are particularly interesting for socio-economic settings due to their potential to simulate even complex interactions among human behavior, economic dynamics, and local constraints, making them specifically useful in the case of rural regions. Indeed, these simulation models can mitigate intervention risks, providing support to evaluate benefits and costs a priori (Singh et al., 2022). In the design of Digital Twin models, Agent-Based Modeling (ABM) and System Dynamics (SD) have almost always been applied separately in rural studies, as for example in Bogason et al. (2024) and in Sarangi and Pradhan (2020). The integration of these two modules thus remains nearly a novelty which, together with Geospatial Optimization (GO), can provide support for micro-level decisions (thanks to ABM), evaluating macroeconomic implications (SD) and environmental implications (including constraints) (GO).

Previous studies have examined partial aspects of rural digitalization (e.g., NFTs for artisan economies (Folgeri et al., 2023) or AR for tourism (Gričar et al., 2023)), presenting frameworks for ex-post evaluation. Furthermore, research often relies on simplified or incomplete datasets (Saltelli et al., 2004). The literature review conducted has thus highlighted two virtually unexplored directions: (1) the synergies between digital technologies (e.g., how NFT adoption influences AR tourism demand) and (2) the lack of simulations regarding alignment with EU policy instruments. Therefore, these two themes represent the foundation for the model proposal that follows.

METHODOLOGY

The implemented methodology consists in the adoption of a simplified Digital Twin framework to show its suitability to evaluate the socio-economic impact of AR and NFTs development in rural contexts.

The presented framework integrates Agent-Based Modelling systems (ABMS) and System Dynamics (SD) to support micro-level decision-making and macro-scale returns, complementing the two by Geospatial Optimization to ensure a deployment respecting local constraints and environment.

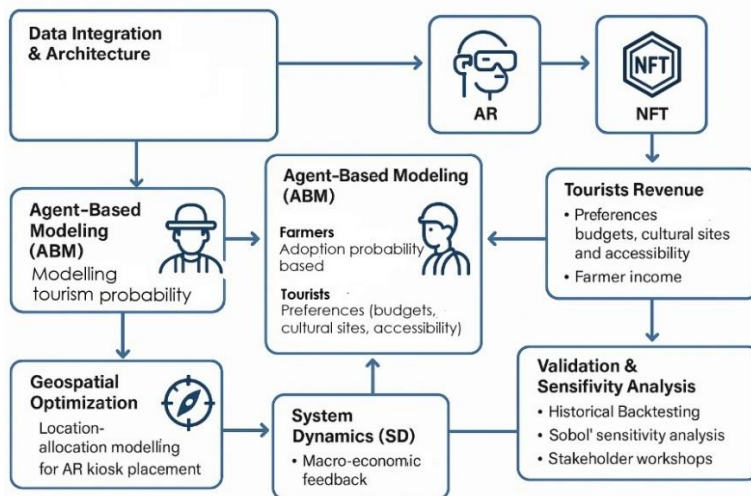


Figure 7: System architecture

All code and scripts developed for this study are publicly available on GitHub at <https://github.com/Foraf/DigTwinEconometrics.git> under an open-source license, granting permission for reuse and modification by other scholars for research purposes.

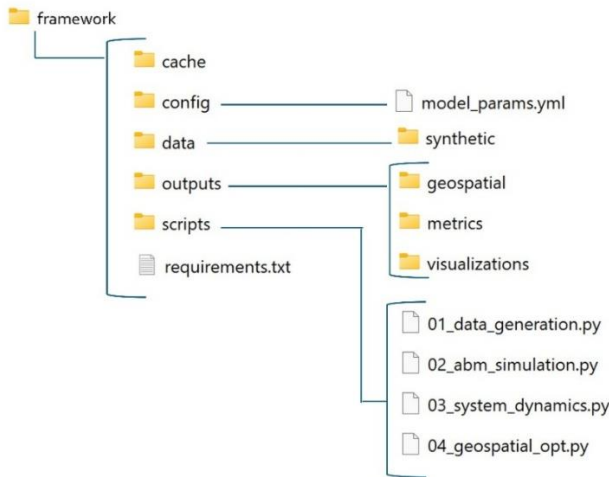


Figure 8: implementation architecture

Data Integration and Architecture

The framework synthesizes geospatial and socio-economic data to model Lika-Senj's rural system. Data comes from:

- OpenStreetMap (OSM), a free and open-source geographic database of the world including:
 - Nodes: Unique IDs (osmid), latitude (y), longitude (x)
 - Edges: Street segments with lengths, travel times, etc.
 - Tags: Additional metadata (e.g., amenity=restaurant).
- Eurostat and Croatian Bureau of Statistics (2015–2023), providing socio-economic datasets, including population demographics, tourism statistics, and agricultural revenues.

The framework combines open-source geospatial data (OpenStreetMap) with official socio-economic datasets (Eurostat, CBS) and synthetic data generated from peer-reviewed literature, providing a replicable tool for simulating scenarios in data-limited contexts. This approach balances empirical rigor and flexibility, supporting evidence-based policy decisions.

This methodology is common in complex systems and digital twin studies, where the integration of real and simulated data is necessary to model future scenarios, typically combining: geospatial data extracted from OpenStreetMap (e.g., road networks, cultural sites); synthetic/artificial data, generated based on Official sources (Eurostat, Croatian Bureau of Statistics) for socio-economic data (tourism, agriculture, demographics), prior studies (e.g., adoption rates of NFTs/AR in similar rural contexts) and calibrated assumptions (e.g., System Dynamics equations, ABM parameters such as $\beta_2 = 0.3$ for peer influence).

Thus: OpenStreetMap provides real-world data used to geolocate infrastructure and spatial constraints (e.g., accessibility to cultural sites); Eurostat/CBS supply historical statistics (2015–2023) on tourism, population, and agricultural income, used to calibrate the model; Artificial/synthetic data were generated to simulate NFT transactions (synthetic NFT transaction data, 10% of cases, were mitigated via bootstrap resampling. Future iterations could incorporate prospect theory to refine decision-making logic); AR demand was estimated from seasonal tourism surveys and analogous studies (e.g., Prodingner & Neuhofer, 2023); Agent-Based Models (ABM) were constructed as Watts-Strogatz networks, with parameters derived from literature (Namatame & Chen, 2016; Sabzian et al., 2018).

The framework is easily adaptable to other applications and future expansions, as it integrates real-world data (where available) to anchor the model to empirical reality; uses synthetic data based on consolidated evidence where real-world data are scarce, enabling simulations despite incomplete datasets; is replicable through substitution with local data.

Agent-Based Modeling (ABM)

In this first simplified version, the ABM component, developed in Python using the Mesa library, simulates two key agent groups:

Farmers: the adoption of NFTs is modeled using a logistic regression framework, where the adoption probability depends on:

- Income thresholds, calibrated to *Lika Quality* participant data extracted by *Croatian Bureau of Statistics*.
- Peer influence $\beta_2 = 0.3$, derived from literature (Malik et al., 2023).

- Broadband access (DESI, Europa.eu, 2025).

Tourists: Tourists' AR choices are hypothetical (based on analogies from other studies, e.g., Proding & Neuhofer, 2023). The AR engagement is modelled via discrete choice experiments, where preferences depend on:

- Seasonal travel budgets (Eurostat and Croatia Bureau of Statistics).
- Proximity to AR-enabled cultural sites (e.g., Plitvice Lakes), from OpenStreetMaps (OpenStreetMaps, 2024).
- Accessibility of digital kiosks simulated using a spatial optimization model (e.g., geopandas) to efficiently allocate kiosks.

Agents interact on a Watts-Strogatz network reflecting Lika-Senj's village connectivity. Spatial attributes (e.g., distance to heritage sites) were embedded using OpenStreetMap coordinates.

System Dynamics (SD)

The SD module developed using scipy (ODE solvers, docs.scipy.org, n.d.). It captures macro-economic feedback. Key equations focus on:

Tourism revenue (T): Driven by AR-induced off-season demand.

$$\frac{dT}{dt} = \alpha \cdot AR_{adoption} - \delta \cdot T$$

where α represents AR's demand multiplier and δ accounts for seasonal decay.

Farmer income (F): Influenced by NFT premium pricing.

$$F(t) = F_0 + \gamma \cdot NFT_{adoption}$$

where γ denotes revenue per NFT-adopting farmer.

Parameters were calibrated against historical data (2015–2023) using Kalman filtering.

Geospatial Optimization

A location-allocation model optimized AR kiosk placement to maximize coverage of cultural sites and tourist hubs while minimizing infrastructure costs. The p-median formulation in GeoPandas combined with PySAL (Pysal.org, 2020) and NetworkX (NetworkX, n.d.) ensured 95% coverage of key heritage areas (e.g., Gospić, Otočac) under EU Smart Villages accessibility thresholds.

Validation and Sensitivity Analysis

The study employed a rigorous multi-method approach to validate the digital twin framework and assess its sensitivity to key parameters. First, historical back testing was conducted to evaluate the model's predictive accuracy by comparing simulated outputs against empirical observations. Specifically, the model's projections for tourist arrivals and farmer revenues demonstrated strong alignment with historical data from the Croatian Bureau of Statistics (2015–2023), achieving a coefficient of determination ($R^2 > 0.82$). This high R^2 value indicates that the framework reliably replicates real-world trends, providing confidence in its capacity to simulate future scenarios under varying intervention strategies.

To quantify the relative influence of input parameters on model outcomes, a Sobol' sensitivity analysis was performed. This variance-based method decomposes uncertainty into contributions from individual parameters and their interactions. The analysis revealed that peer influence among farmers ($\beta_2 = 0.3$) and annual AR maintenance costs were the most significant drivers of variability, accounting for 63% and 22% of total variance, respectively. These findings align with prior studies on technology adoption in rural contexts (e.g., Capello & Lenzi, 2019; Rodriguez-Pose, 2018; Sarangi, A.K. and Pradhan, R.P. (2020), where social networks and cost barriers similarly emerged as critical factors. By cross-referencing these results with historical adoption patterns from the Croatian Bureau of Statistics, the study reinforces the external validity of its sensitivity conclusions.

A notable limitation of this study is the inability to assess the model's practical relevance through direct stakeholder engagement, such as workshops with local policymakers. While the framework was calibrated against historical data and literature benchmarks, the absence of participatory validation introduces uncertainty regarding its alignment with real-world policy priorities and constraints. This preliminary phase of the research underscores the need for future iterations to incorporate structured stakeholder feedback, particularly from regional planners and community representatives. Such engagement would ensure that the model's assumptions, especially those related to behavioral adoption (e.g., risk aversion) and spatial inequities, reflect ground-truth conditions. Given the place-based nature of rural development, iterative collaboration with local actors is essential to bridge the gap between theoretical simulations and actionable policy design.

RESULTS AND DISCUSSION

To validate the proposed Digital Twin framework, the model was tested on the Lika-Senj region. The simulated outputs were systematically compared against both analogous studies in the literature and historical datasets from Eurostat and the Croatian Bureau of Statistics.

Regarding NFT integration, the logistic regression algorithms projected a 25% increase in farmer incomes over five years ($p < 0.01$), consistent with findings from comparable rural regions (Merrell, 2022; Xiaochang, 2023). The model incorporated peer influence ($\beta_2 = 0.3$) and proximity to digital training hubs as key adoption drivers, aligning with Malik et al.'s (2021) framework for blockchain-based rural value chains.

For AR tourism interventions, simulations indicated a 28% rise in off-season visitation, corroborating empirical results from similar real-world implementations (Han et al., 2013; Özkul & Kumlu, 2019), see table 1. Spatial optimization identified Gospić and Otočac as optimal deployment hubs. Qualitative analysis confirmed these locations cover 95% of cultural heritage sites (e.g., Plitvice Lakes) and—given existing infrastructure—are likely to minimize implementation costs.

Table 8: Simulated outcomes of NFT and AR interventions in Lika-Senj, Croatia. Results highlight income gains, tourism redistribution, and policy synergies, alongside infrastructural and behavioral constraints to be considered in future developments of the model.

Intervention	Key Metrics	Quantitative Results	Key Constraints	Policy Alignment
NFT Certification	Farmer adoption rate	25% ($p < 0.01$)	Digital literacy gaps (to be taken into account)	CAP 2023–2027 eco-schemes
AR Tourism	Off-season visitation	+28% winter attendance	High maintenance costs (unexplored in the model)	Digital Europe Programme

The primary objective was not to generate precise quantitative forecasts but to evaluate whether a simplified, early-stage framework could produce results comparable to empirical studies, thereby demonstrating its utility for decision support. While synthetic data (e.g., NFT transaction proxies) may overlook behavioural nuances like cultural resistance, and though the model achieved strong historical validation ($R^2 > 0.82$), approximations inherent to such simulations necessitate cautious interpretation.

Nevertheless, the model's alignment with both historical trends and peer-reviewed findings substantiates its capacity to guide cost-benefit assessments of digitalization projects (here, NFTs and AR) while mitigating territorial risks. This supports the core research question:

Can an integrated Agent-Based Modelling System (ABMS), augmented with System Dynamics (SD) and Geospatial Optimization (GO), serve as a simulation tool to prioritize interventions—maximizing cost-benefit ratios within local resource constraints—for policymakers?

The preliminary affirmative answer highlights the potential of such frameworks to bridge computational modelling and policy design, though future iterations should address data granularity and stakeholder validation to enhance robustness.

To optimize computational efficiency given hardware limitations or if interested in specific sub-areas, it is possible to customize the script `04_geospatial_opt.py` and restrict the geographic scope to a sub-area, thereby reducing node complexity while retaining analytical relevance.

CONCLUSION

The significance of the digital twin framework's results lies not in their absolute values but in its potential to test technology and policies for rural areas. Furthermore, their alignment with historical data from Eurostat and the Croatian Bureau of Statistics demonstrates the framework's validity in addressing the research question regarding simulation-based policy support. The projected 25% income increase from NFT adoption and 28% rise in off-season tourism match empirical trends observed in comparable rural contexts, while spatial optimization outcomes reflect known infrastructure patterns in Lika-Senj. Though synthetic data approximations require cautious interpretation (particularly for behavioural factors like cultural resistance), the model's consistency with official statistics confirms its potential capacity to simulate intervention impacts within real-world constraints. This validation establishes that an ABM-SD-GO integrated approach can effectively guide policy prioritization, as demonstrated through the NFTs and AR test cases, while highlighting the need for future refinements through stakeholder engagement and higher-resolution data integration.

While this study provides a foundational framework for evaluating digital interventions in rural contexts, several limitations must be acknowledged, along with critical pathways for future development. The current implementation focuses exclusively on farmers and tourists as agent categories, representing a simplified version

of the complex socio-economic ecosystem. Future development should include additional groups, such as local entrepreneurs, policymakers, and infrastructure providers, to better picture the multi-actor dynamics of rural areas. A further constraint lies in the model's behavioural assumptions, specifically the absence of consideration of well-documented phenomena such as cultural resistance and risk aversion. Furthermore, although synthetic NFT transaction data (representing 10% of cases) were statistically mitigated through bootstrap resampling, future refinements should integrate behavioural economics frameworks, such as prospect theory (Levy, 1992; Barberis, 2013; Mejía, 2021), to enhance the realism of agent decision logic.

Empirical validation represents another crucial future step. In fact, the model demonstrates internal consistency and alignment with historical trends, but its projections require validation through comprehensive survey data, pilot implementations, and longitudinal tracking of real-world intervention outcomes. Such empirical validation would bridge the gap between theoretical simulation and practical policy relevance.

Similarly, unfortunately in literature there are too few studies to compare the results with. Hopefully this paper will encourage other scholars to test the twins' model in different contexts.

Finally, the absence of direct stakeholder engagement in the model's development represents a significant limitation for its applicability in real-world policymaking. Future research should prioritize participatory co-design with local actors, ensuring that behavioural realism is adequately addressed. Ethnographic studies on technology adoption barriers, localized infrastructure assessments, and alignment with EU funding cycles would strengthen the framework's utility as a decision-support tool.

To conclude, in a future model the temporal aggregation of data should be parametrized to give the possibility to better explore temporal and seasonal dynamics.

Addressing these limitations would turn the framework from a theoretical prototype to a robust, policy-ready instrument, preserving its core strengths in integrating agent-based modeling, system dynamics, and geospatial optimization.

ACKNOWLEDGEMENTS

This research was funded by the Department of Philosophy “Piero Martinetti” of the University of Milan under the Project “Departments of Excellence 2018-2022” awarded by the Ministry of Education, University and Research (MIUR).

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THE IMPACT OF FISCAL INCENTIVES ON SMES' GROWTH: CASE OF ALBANIA

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Abstract::

It is so crucial to develop the appropriate governmental policies to promote the comprehensive growth of Small and Medium Enterprises in order to converge towards the sustainable growth in Albania. Meanwhile, it is so significant to adopt the appropriate budgeting programmes in order to provide the development Small and Medium Enterprises in developing countries, particularly in Albanian business environment. The public fiscal sustenance should provide the fitting inducement towards the sustainable growth of SMEs, particularly in developing countries. Also, the robust results of governmental policies should focus to enhance the competitiveness of SMEs within Albania and external markets.

The paper examines the impact of government budgeting programmes in Albania towards the SME's growth and the value added of SMEs using the primary and secondary data during 2008 – 2023. Otherwise, we did not find the significant positive correlation amongst the budgetary expenditure of government and the SMEs' growth. We demonstrated the volatile propensity of growth ratio related to the number of enterprises, employed number, value added, investment and budgetary expenditure referring SMEs during the specific period. Our findings confirmed the necessity of effective fiscal incentives in long run by the policymakers in order to optimize the SMEs growth in Albania.

Keywords: Fiscal incentives, SMEs' growth, sustainable growth;

INTRODUCTION

The focus of economic program 2025-2027 by the Albanian government anticipates profoundly to change the circumstances related to the private sector growth in Albania through the comprehensive reforms linked to the sustainable enhancements within the business conditions focusing on (i) multidimensional aspects of business-government relationship; (ii) regulatory frameworks and (iii) market institutions. The core objective of this pillar of reform focuses on updating the relationship amongst businesses and government, shrinking administrative blockades and generating the advantageous surroundings in order to enlarge the investment and productivity growth. Meanwhile, the tax administration modernization strategy will expect to generate the positive effects in the short run due to the abridged procedures and enhanced digital services providing the diminishing obedience costs according to businesses, particularly profiting SMEs because of unequal administrative burdens (Albanian Council of Ministers (2025)).

Furthermore Akawu et al. (2023) found that the government capacity building programmes have significantly affected the development of SMEs in Keffi Local Government Area of Nasarawa State. Meanwhile the authors highlighted that the financial support by the government demonstrated a significant and positive effect towards the SMEs' development in this area. Furthermore, their results disclosed a significant relationship amongst the infrastructural support programmes proving by government and the development of SMEs in the area. Otherwise, they recommended the necessity for the government to run these programmes unceasingly in order to boost SMEs. Meanwhile Alabi et al. (2019) examined the influence of governmental policies on the business development of SMEs operating in six states of Nigeria. Their research results highlighted that there was a substantial correlation amongst the governmental policy and the business growth of SMEs in these states. Also, their results demonstrated the obligation for Nigerian government to compile and to implement the supportive policies in order to guarantee the optimal performance and successive subsistence of SMEs within the country. Furthermore, the authors emphasized that the state's monetary policies and macroeconomic indicators should be adapted for SMEs in these states. Meanwhile the authors recommended that the Nigerian government should adopt and enforce laws, regulations and policies related to the institutional and infrastructural development, and an enabling environment in order to stimulate SMEs' growth and endurance.

Consequently Bhattacharya et al. (2024) examined how the development of SMEs in developing countries influenced by trade, monetary, fiscal, and regulatory policies. Also, the authors emphasized that policies such as tax breaks, easy access to finance, subsidies, and regulatory changes stimulated the business environment and the sustainability and performance of SMEs. Their research analysis reveals the gaps regarding the necessity of policy interventions and distinguished the serious part supporting SME growth through assessing the advantages and

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The participation at 10th Business & Entrepreneurial Economics conference funds by project: Up – Skilling Researchers for Sustainable Entrepreneurship based on Invitation Process Management – USE IPM.

disadvantages of diverse policies. Their research results highlighted the prerequisite for solid and helpful policy outlines to address the specific challenges confronted by SMEs in developing circumstances.

However, the digital evolution requires the sustenance towards innovative businesses in order to stimulate the digital implementation in Albanian economy. The reform program includes instruments to fund technology progress and boost digital espousal within traditional businesses. Referring to these circumstances, a singular consideration is addressed to SMEs throughout the digital renovation process through the helpful measures towards the valuation of their digital requirements, the execution of fitting outcomes and the improvements of crucial skills related to their workforce. This reform support is so vital to provide the penetration of digitalization in the whole sectors of economy except of large enterprises. The reform package focuses on the regulatory background correlated with initial digital technologies and business models in order to generate auspicious surroundings towards the innovation (Albanian Council of Ministers (2025)).

The paper will be organized into four sections. Section 2 examines theoretical and empirical research about the fiscal incentives towards SMEs' growth. The third section demonstrates the empirical analysis on SMEs dynamics in Albania. The concluding remarks sections finalize the paper's findings.

LITERATURE REVIEW

Despite of academic debates regarding the government support initiatives for SMEs, the convergence of government intervention is undeniable, particularly in developing countries. According to the framework of theoretical and empirical assessments, ongoing debates focus on the type of fiscal incentives in terms of the appropriate effectiveness of diverse measures.

Kumar and Singh (2023) demonstrated that government support programs affected potentially with positiveness towards the development and growth of SMEs, but their effect would be depended on (i) sorts or levels of support; (ii) sorts or sizes of SMEs; (iii) sorts or performance indicators; (iv) dissimilar data sources. Meanwhile, the authors emphasized that the direct or indirect effects related to the development and growth of SMEs as a result of government support programs depended on the objectives, design, implementation and evaluation of programs, as well as the characteristics, behaviors and environments of SMEs. Also, they highlighted according to the framework related to the proposal and execution of government support programs for SMEs, it would require a prudent and comprehensive valuation associated with various failures or dynamic challenges of SMEs within diverse sectors or regions. Meanwhile, the authors recommend that government support programs for SMEs should be synchronized and matched with additional strategies and plans correlated with SMEs' development and growth, in order to achieve a lucid and justifiable convergence amid diverse objectives, instruments, and actors.

Ding (2024) examined the effect of Value-Added Tax (VAT) and income tax incentives related to the enlarge of SMEs in China. He found that the VAT and income tax incentives demonstrated the positive effect according to the SMEs' revenues and asset growth using all-inclusive panel dataset during 2015 - 2023. However, the author argues that the spectrum of these effects has significant differences across industries, so that it would be so beneficial related to the high-tech industry and industry of information technology. He concludes that the efficacy of tax incentives explained by the explicit characteristics of industry, particularly related to the intensity of research and development, and for capital necessities, referring to a comparative analysis of industry. The author's empirical results provide the crucial empirical evidence regarding towards the optimization of SMEs' tax policies, particularly suggesting the industry concerning to the tax incentives. The author provides robust visions for policymakers towards SMEs' support systems according to the framework of latest dynamics related to the technology and economic transformation.

Icka et al. (2021) explored the sustainable practices of environment within SMEs in Albania according to the context of rising global mindfulness related to the reputation of these practices. They emphasized that the increasing consciousness should take into consideration the growing authorized requirements from governments, consumer demands and political or social burden. The authors concluded that the first significant step to rise the sustainability activities by Albanian businesses should focus on the drafting and adoption of laws and regulations according towards the current EU practice mandatory for the implementation of green business practices. Meanwhile, they discussed the results of their interviews related to Albanian SMEs regarding their sustainability practices and also demonstrated that numerous SMEs were conscious about environmental sustainability and have started to execute these practices despite of absence of detailed sustainability requirements in Albania. Furthermore, the authors emphasized that the preparatory processes of SMEs in Albania are justified due to the reason of achieving the requirements in order to integrate into global markets in close future, particularly within the common market of European Union.

Radas et al. (2014) explored the impacts of direct grants and tax incentives on SMEs. The authors emphasized that the direct grants and tax incentives are two different public instruments used to accurate market failure and enable innovation by reducing the cost of R&D. They stated the restricted practical evidence concerning the efficacy of public R&D instruments for SMEs, because large and small businesses may invent in unresponsive ways. Their

empirical data demonstrated that direct subsidies executed with or without the tax incentives reinforced the R&D direction of SMEs. Meanwhile their empirical results proved no significant variance according to the users of direct grants compare to the users of both grants and tax incentives. The authors' result illustrated the restrictions relate to the use of tax incentives by SMEs, therefore they advocated the subsidies' use due to considering the focal instrument for SMEs.

EMPIRICAL ANALYSIS ON SMES DYNAMICS IN ALBANIA

Referring to the static data during 2023 presented in Table 1, it results that the main indicators regarding the number of enterprises, the number of employees and the added value according to the size of enterprises are determined by the contribution of SMEs. Also, it should be noted that micro enterprises demonstrate the highest contribution related to the above indicators. Meanwhile, the contribution of SMEs correlated to the above indicators in the European Union should be specified through a comparative static. In the same way, it is observed that they have the highest contribution towards the number of enterprises, the number of employees and the added value according to the classification of enterprises' size in the European Union. Meanwhile, it should be noted that the contribution of enterprises' number in Albania and the European Union is almost the same, but is simultaneously determined by SMEs to the total number of operating economic enterprises.

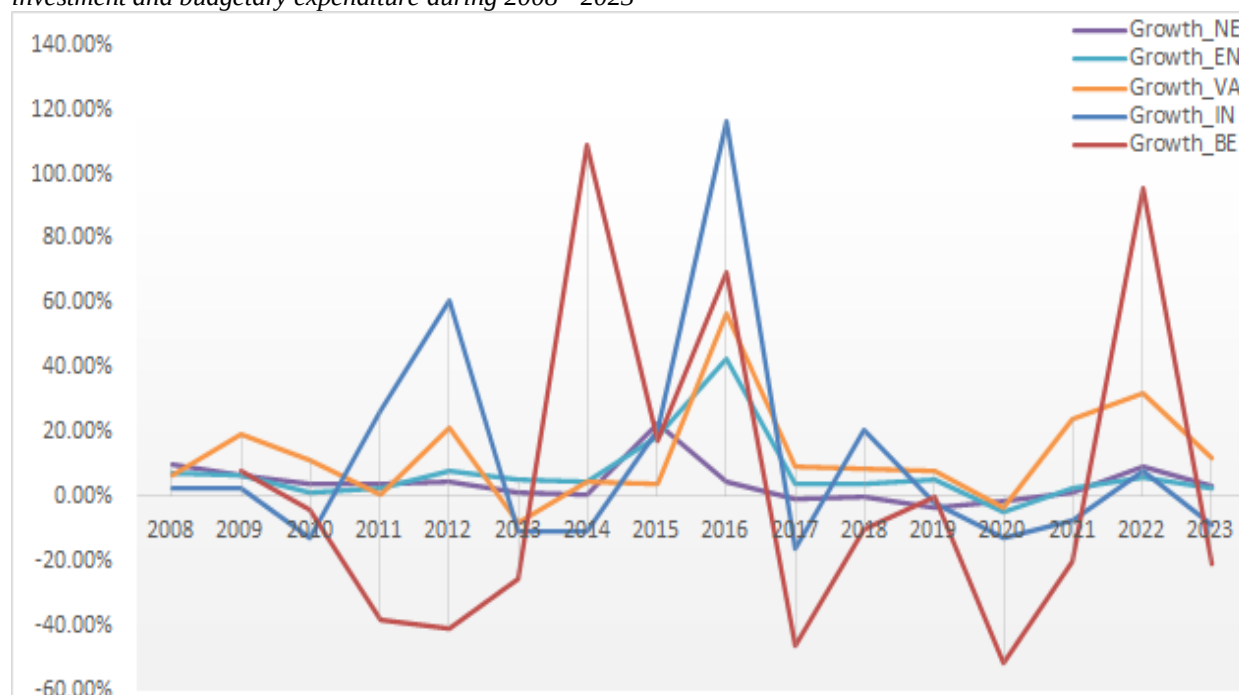
Table 1 Structure of main indicators by size class of enterprises in Albania and EU, 2023.

Enterprises size class	Enterprises (%)		Employed (%)		Value Added (%)	
	Albania	EU*	Albania	EU*	Albania	EU*
SME (1-249 employed)	99.9	99.8	82.5	64.2	78.2	48.9
Micro enterprises (1-4 employed)	93.5	94.2	37.9	30.6	27.8	16.5
Small enterprises (10-49 employed)	5.3	4.8	21.5	18.6	25.5	15.3
Medium enterprises (50-249 employed)	1.1	0.8	23.1	15.0	24.9	17.1
Large enterprises (250+ employed)	0.1	0.2	17.5	35.8	21.8	51.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: INSTAT (2025)

To analyze the impact of fiscal incentives on the development of SMEs, we take into consideration the indicator of budget expenditures on SMEs, as a budgetary support measure, during the period 2008 - 2023. To assess the effective impact of these budget expenditures on the development of SMEs, we explore the dynamic analysis referring to the growth rate of enterprises' number, the number of employees, value added and investments related to SMEs in Albania during the reference period. Graph 1 shows the dynamics of growth ratio according to the number of enterprises (Growth_NE), number of employees in enterprises (Growth_EN), value added (Growth_VA), investments (Growth_IN) and the growth ratio of budget expenditures (Growth_BE) correlated to SMEs during 2008 – 2023. This graph demonstrates that there is no positive correlation between the growth ratio of budget expenditures on SMEs and the growth ratio of other SMEs' indicators. Graph 1 confirms that the series of growth ratio of budget expenditures on SMEs is more volatile compared to the series of other SMEs' indicators. These fluctuations are influenced by internal and external shocks, but also by the political budget cycles associated with electoral years. Also, the investment ratio illustrates the considerable volatility, with an almost converging propensity with the growth ratio of budget expenditures on SMEs, but not to the same extent. Meanwhile the more stable volatility is shown by the series of growth ratio related to the number of enterprises and the number of employees in SMEs, demonstrating a converging trend amongst them. Furthermore, the series of growth ratio of the value added of SMEs proves the moderate volatility, but not with the same converging trend with the growth ratio of enterprises' number and employed number within SMEs.

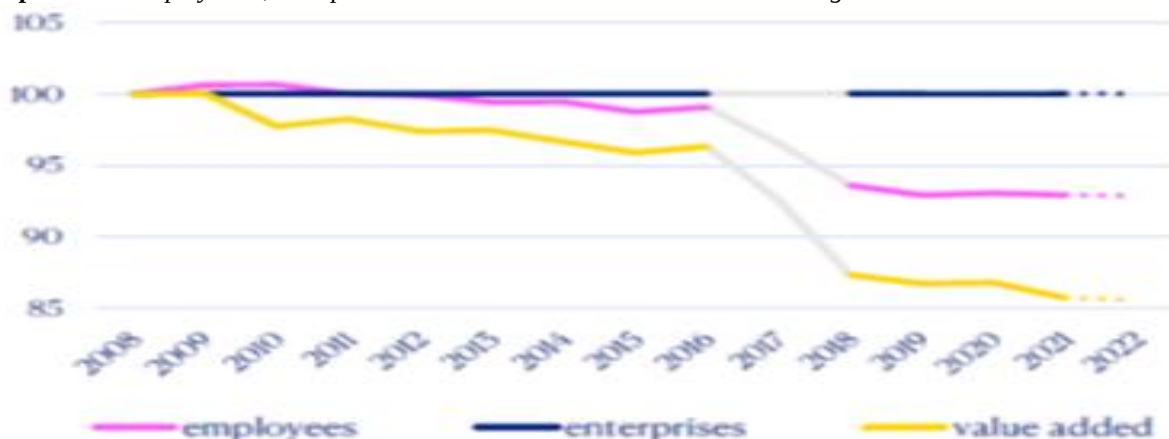
Graph 1 Dynamics of growth ratio related to SMEs' number of enterprises, employed number, value added, investment and budgetary expenditure during 2008 - 2023



Source: Authors' calculations based on Albanian Ministry of Finance and INSTAT (2025)

Following the comparative dynamics, Graph 2 presents the contribution of employees, enterprises and value added for SMEs in the European Union during the period 2008 - 2022. This graph shows that the value added of SMEs has a greater volatility compared to the number of employees and enterprises in the European Union, but moderate nonetheless. The break point in the trend of contribution towards the number of employees and value added is demonstrated after 2016, despite of SMEs contribution remains decisive again in the future.

Graph 2 SME employment, enterprises and value-added shares in the EU during 2008 - 2022.



Source: European Commission (2024)

CONCLUDING REMARKS

Static and dynamic assessments demonstrate the decisive contribution of SMEs in Albania in terms of the number of enterprises, the number of employees, the value added and investments, but with the same trend with the contribution of SMEs in the European Union. However, we do not conclude a significant positive correlation between the budget expenditures of the Albanian government towards SMEs and the growth of SMEs. As a result, policymakers should determine the type and measure of fiscal support by the government towards SMEs in order to optimize the growth of SMEs in Albania. The volatility of growth ratio according to the budget expenditures compared to the growth ratio of the enterprises' number, the number of employees, the value added, investments,

demonstrating the lack of solid convergence and long-term sustainability. The necessity of budgetary support is crucial for the consolidation of SMEs in our country, both in the context of progressive technological developments, but also in accordance of requirements of global markets.

ACKNOWLEDGEMENT

This research is part of the 101120390 - USE IPM - HORIZON-WIDERA-2022- TALENTS-03-01 project, funded by the European Union. Views and opinions expressed are however those of the authors only and do not necessarily reflect those of the European Union or the European Research Executive Agency. Neither the European Union nor the European Research Executive Agency can be held responsible for them.

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HOW IMPORTANT IS ONLINE CONTENT MARKETING FOR COMPANIES?

RELEVANCE OF THE STRATEGIC APPROACH AND VALUABLE CONTENT

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Abstract:

Many companies struggle to execute successful online content marketing activities. Moreover, many businesses are uncertain about what constitutes valuable content. Despite this, having a strategic approach and effective online content is essential for companies to thrive in the digital marketplace. Therefore, this study aims to explore these issues by examining whether companies employ strategic approach to online content marketing and how they perceive valuable online content. Online content marketing refers to the creation and dissemination of information to a clearly defined target group of consumers to achieve specific goals. It requires a strategic approach that includes several phases and to establish and maintain a company's reputation as trustworthy. Creating valuable content across various online media platforms requires companies to shift from a sales-oriented approach to a communication style focused on providing useful, relevant, and timely information and entertainment, i.e. compelling content. Existing literature suggests that companies are aware of online content marketing, but their strategic approach and understanding of valuable content may be lacking. To gain deeper insights, we employed a qualitative research method, specifically conducting in-depth structured interviews with five different companies. The research results indicate that the companies studied have developed general efforts and goals for online content marketing. However, only two out of five companies have a documented online content marketing strategy and have planned all phases necessary for developing such a strategy. Regarding valuable content, the companies agree that valuable online content should be useful, unique, meaningful, relevant, reliable and interesting. However, there is no consensus on whether valuable content should also be timely, current, fun, created based on consumer needs, add value or tell a story. Our findings suggest that there is still significant room for improvement in this area.

Keywords: online content marketing, valuable content, strategic approach, companies

INTRODUCTION

It is predicted that the content marketing industry will reach more than 500 billion dollars in 2025 (Connell, 2025), which emphasises the importance of exploring this area. Ineffective content marketing can lead to significant losses. In fact, poorly targeted digital marketing campaigns cause over \$600 billion in losses annually (Cozmiuc, 2024). Furthermore, more than 70% of content created goes unused (Dincoy, 2024). This highlights a major gap. Namely, although content marketing is widely recognised as essential, many companies struggle to use it effectively, often due to a lack of a clear strategy and misconceptions about what really constitutes valuable content. Online content marketing refers to the creation and dissemination of information (e.g. via online media, websites, social networks, newsletters, etc.) to a clearly defined target group of consumers in order to achieve specific goals (Ho et al., 2020). It requires a strategic approach involving multiple phases to build and maintain an organisation's reputation as trustworthy (Lou & Xie, 2021). Creating valuable content on various online media platforms requires organisations to shift from a sales-oriented approach to a communication style that focuses on providing useful, relevant and timely information and entertainment, i.e. persuasive content (Content Marketing Institute, 2025). Many organisations struggle to execute successful online content marketing activities. The biggest challenges regarding online marketing content are the lack of a content marketing strategy or an ineffective strategy (Brown, 2023). Existing literature (Brenner, 2022) suggests that while organisations are aware of online content marketing, they lack a strategic approach and understanding of valuable content. However, a strategic approach and effective online content is essential for organisations to succeed in the digital marketplace (Chaffey & Smith, 2022). This emphasises the importance of examining whether companies truly understand what constitutes valuable online content and how they go about it, i.e. whether they make strategic decisions that cover all stages of the process. Recognising this is crucial as it can have a direct impact on the success of their marketing efforts. Since companies have recognised the importance of the digital landscape, online content marketing has risen to become a key strategic tool. Considering the previously discussed issue, i.e. to fill the gaps and explore the importance that companies attach to online marketing content, this paper aims to assess the use of the strategic approach and companies' perception of valuable content in relation to online marketing content efforts by using qualitative research, i.e. in-depth interviews.

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LITERATURE OVERVIEW

Content marketing

Although content has always existed in various forms, whether good or bad, one of the most significant changes in traditional marketing is the rise of digital marketing, which is forcing companies that want to remain competitive in the digital age to rethink their strategies (Uğrasız, 2024; Holliman & Rowley, 2014). With this change, content marketing has become a key element of a successful online business and its most important tool. As defined by Cohen (2016) and the Content Marketing Institute (2025), it is about creating and distributing relevant and useful content to attract, engage and retain a clearly defined audience with the aim of triggering profitable customer actions. This approach goes far beyond the mere production and distribution of content, and aims to increase brand awareness, build trust, attract new customers, create demand, foster loyalty and build an engaged audience (Jain, 2024; Baltes, 2015). The role of content marketing is steadily increasing and is now an essential part of any digital presence. To be effective, it must follow a strategic approach that is aligned with the needs of the target audience and the organisation's goals (Grubior & Milovanov, 2016). As Shaikh & Nigade (2020) emphasise, it should not function in isolation, but should be fully integrated into a company's overall marketing strategy.

Strategic approach

A content marketing strategy is a plan for building an audience through the creation of content that informs, entertains or inspires, with the ultimate goal of converting prospects into buyers (Šoštarić, 2014). It should be strategically developed and aligned with company and customer goals. Nevertheless, many companies are not sure whether they need such a strategy or why. Those that have a documented strategy generally act more confidently, overcome challenges more easily and are more successful in achieving their goals. Clearly defined goals (what, how, when, who and why) significantly improve the chances of a successful online presence (Naseri & Nozuri, 2018). In addition to integrating content marketing into the overall strategy, the content creation process involves three important phases: planning, preparation and distribution (Naseri & Nozuri, 2018). Planning involves setting goals, defining the target audience and developing a content plan. Preparation focuses on creating valuable, relevant and shareable content based on previous insights that are customised for each platform (Naseri & Nozuri, 2018). The distribution phase involves the selection of media channels and a strategy (push, pull or both). The push strategy focuses on sales-oriented advertising, while the pull strategy builds long-term loyalty through informative and engaging content (Jagetić-Daraboš, 2020). Most companies combine both approaches depending on their objectives (Brocato, 2010). Each phase is interlinked and essential for effective content marketing.

Valuable content

Before creating content, it is crucial to analyse the target audience and their demographics in order to tailor the content to their preferences (Baltes, 2015). Valuable content, defined as relevant, interesting, necessary, persuasive and timely, is central to content marketing as it is of real help to users (Taylor, 2023; Armour, 2014). However, many organisations still treat content marketing as a tool for spreading sales messages rather than providing helpful information. Companies that focus on creating meaningful content in the language of the customer, without directly promoting sales, have a greater chance of building awareness, loyalty and long-term relationships (Geraint & Rowley, 2014). Content therefore reflects the value an organisation provides through education, inspiration and support (Šoštarić, 2014). Organisations also need to ensure that their content is accurate and up-to-date, as outdated information can diminish its value (Sela, 2023). Ultimately, valuable content is the result of a strategic, continuous process.

RESEARCH QUESTIONS

A clear content marketing strategy helps companies to build stronger relationships with their target group (Putra et al., 2025; Content Marketing Institute, 2025). Nevertheless, only 35% of companies have a documented strategy, while 48% have a non-written strategy (Dean, 2024; Baltes, 2015). Despite the rise of digital marketing, many organisations still underestimate or refuse to implement the integration of online content marketing into their broader strategy (Zhang, 2023). Research shows that companies with a documented strategy are more likely to

succeed with content marketing, while companies without such a strategy often struggle (Petrova, 2022). A strategic approach allows organisations to move from unstructured content creation to a targeted, measurable and continuously improving system (Petrova, 2022). Yet over 57% of organisations consider their marketing strategy to be ineffective and only 15% have formally documented it (Verge Marketing Agency, 2022), highlighting a significant gap. With this in mind, the following research question is posed:

RQ1: Do the (analysed) companies use a strategic approach to online content marketing?

Valuable content is crucial for organisations (Pranata et al., 2024) and must be useful, entertaining, authentic, relevant and timely, exactly when the audience needs it (Taylor, 2023; Stjepić, 2016). To be truly valuable, content must be unique, meaningful and created specifically for the target audience (Salonen et al., 2024). Companies need to prioritise the audience's needs over their own interests in order to produce content that resonates (Salonen et al., 2024; Stjepić, 2016). When content provides value to the customer, it also benefits the organisation, achieving the balance that content marketing strives for (Jefferson, 2015). Valuable content builds trust, credibility and engagement (Gryphon, 2023), but it remains unclear what constitutes it from an organisation's perspective. Therefore, we propose the following:

RQ2: Are organisations clear about what valuable online content means?

METHODOLOGY

Sample and data collection

A qualitative method, in particular in-depth interviews, was used for this study. Five senior representatives from different companies (a hotel, a retail chain, a natural cosmetics brand, a sports and rehabilitation centre and a sports stock corporation) were interviewed. The companies were randomly selected based on their relevance to the study. In accordance with the GDPR and the wishes of the participants, the names of the companies will be kept confidential. All participants gave informed consent and were assured anonymity and voluntary participation. Interviews were conducted in August and October 2022 and April 2023, with questions focusing on key constructs from the relevant literature.

RESULTS

The results suggest that while companies recognise the importance of online marketing content, many, particularly smaller companies, are not taking a strategic approach. This indicates a lack of awareness that managing online content requires a comprehensive, phase-based strategy. In addition, while organisations value online content, they are not fully implementing all of its (valuable) key features. A summary of the results of the interviews is shown in Table 1.

Table 1. Interview results (summary)

Tourism/Hotel Industry Interview: August 2022 Number of employees: approx. 320	The hotel is active on various online platforms and considers content marketing to be an important part of its strategy, even if it does not have a formalised plan. The focus is on informing customers, strengthening relationships with loyal customers and partners and expanding into new markets. Although the company does not have a documented strategy, it follows a structured approach to content creation that starts with identifying the target audience, brand values and company goals. Most content is created internally, with occasional external support for high-quality visuals. Content is largely created on the fly, but should always be relevant, high quality and tailored to the platform and specific objectives. They see their content as valuable both for the company and for the customers who regularly use it. They define valuable content as useful, timely, unique, meaningful, relevant, up-to-date, reliable and interesting. Although they see content marketing as a worthwhile investment, they feel that their current strategy could be improved with more resources and additional training to keep up with industry trends.
Retail Trade Interview: October 2022 Number of employees: approx. 4,500	The retail chain is active on various digital platforms, including Instagram, Facebook, LinkedIn, its website, webshop and newsletter, but also uses traditional media such as television and radio. The online presence is crucial for the company to raise consumer awareness, promote offers, build loyalty and differentiate itself from the competition. The company has a documented content marketing strategy that is supplemented by ad hoc activities. Content is planned in advance, reviewed and aligned to clear goals, with performance reviewed monthly and annually. The company has an in-house marketing team, a digital marketing department and occasionally works with external partners. To ensure relevance, customer data is

	collected to create customised content that customers find valuable. The company combines all the necessary content qualities concerning valuable content. The main objectives of their content marketing are to increase brand awareness, build customer loyalty, drive purchases, engage consumers and position themselves against the competition. They consider the investment in online content marketing to be worthwhile, but plan to improve analysis and performance reporting.
Trade and Natural Cosmetics Production Craft Interview: April 2023 Number of Employees: 5	The company operates exclusively online, with most sales being made via the webshop and website. Although they do not have a formal strategy, they have clear goals and a vision. They know their audience well and tailor their content to their needs. They initially focussed on Facebook, but then switched to Instagram to target younger customers and also use newsletters to promote discounts and offers. One employee is responsible for all marketing and content is created in collaboration with them. The company prioritises relevant content based on customer data. While the company sees the value of content marketing, it has realised that it needs to be better planned and wants to improve its marketing efforts in the future. Most content is created spontaneously, with the exception of sales and promotions, which are always planned in advance.
Sports and Rehabilitation Centre Interview: April, 2023 Number of employees: approx. 10	From the very beginning, the company has emphasised a strong online presence, focusing on professionalism and valuable content. The owners are directly involved in the creation of the content with their expertise and work together with an employee. They are active on multiple platforms, particularly Instagram and their blog. On Instagram, customers are targeted with customised content, while the blog encourages communication and networking with industry peers. Although they do not have a formal content marketing strategy, they have recently started planning content in advance, which has reduced their workload. Their content marketing aims to educate, share information and position the company against the competition without losing professional integrity and chasing trends.
Sports Joint-Stock Company for Performing Sports Activities Interview: April 2023 Number of employees: approx. 120	The company emphasises content marketing and is active on several platforms, with Instagram, TikTok and its website (which also hosts its webshop) being the most important channels. The company has a marketing department and a dedicated content team, as well as a documented content strategy that focuses on key campaigns that determine the timing and type of content. Content is customised for each platform to achieve specific goals, primarily to drive sales in the European market. Whilst brand awareness and customer loyalty are strong, it is the emotional connection to the club that drives the audience. They are generally satisfied with their online success, but still see room for further improvement.

Source: Research

DISCUSSION

The research shows that although the companies analysed have general goals for online content marketing, only two out of five have a documented strategy and have planned all the necessary phases for its development. This answers our first research question (RQ1) of whether organisations have a strategic approach to online content marketing. This is in line with existing research, which shows that only a small number of companies have a strategic, documented content marketing plan (Verge Marketing Agency, 2022; Baltes, 2015). The situation is similar in Croatia. All of the companies surveyed know their target audience and collect data in order to adapt their content accordingly. While they have a general idea of content planning, only two companies (a retail chain and a sports joint-stock company) plan their content completely in advance. The rest create content either internally or with external help. Three companies have their own marketing departments, while the other two have one employee responsible for digital marketing tasks. Although they have no formal plans, all companies place great emphasis on tailoring content to their target audiences and platforms. They also recognise the need to improve their content marketing strategies in the future.

When it comes to valuable content, the companies in our study agree that valuable online content should be useful, unique, meaningful, relevant, reliable and interesting. However, there is no consensus on whether valuable content should also be timely, current, fun, created based on consumer needs, offer added value or tell a story. Therefore, we answered the second research question (RQ2) on whether companies are aware of what valuable online content means. Namely, our findings are not entirely consistent with existing notions that valuable content is also useful, entertaining, authentic, relevant, timely and "tells a story" (e.g. Stjepić, 2016), suggesting that there is still

significant room for improvement in this area. More specifically, our respondents agree with some characteristics of valuable content, while they do not recognise the importance of other essential characteristics of valuable content. This also indicates that they are not yet sufficiently trained in this respect. Therefore, further knowledge acquisition and implementation is necessary to grasp the role of valuable content.

Theoretical implications

This research contributes to a deeper understanding of online content marketing and its impact on organisations' online presence and business performance. Online content marketing is a broad and evolving field that has not yet been sufficiently researched, especially in the context of rapid digital change. Many researchers have pointed out the lack of empirical studies on this topic, so this qualitative research is a valuable addition. This study makes a further contribution by exploring the stages of a strategic approach to online content marketing, an area that has received little attention to date. Another important aspect covered is the role of valuable content, i.e., its importance to organisations and the process of its creation and distribution. While much research has focussed on the consumer perspective, few studies have examined this topic from the business perspective. Previous research has been mostly theoretical or limited to single case studies and has rarely analysed different companies.

Practical implications

The results of this study provide valuable insights for marketers involved in online content marketing and its integration into business processes. Companies can gain a clearer understanding of digital content marketing as a strategic process by recognising the key stages and the importance of relevant content. In addition, insights into how valuable content is perceived and valued can help organisations develop more effective content marketing strategies. These findings can also provide consumers with a deeper understanding of the processes organisations undertake to create and deliver online content. Although the study is based on a small sample, it shows the importance of content marketing to both business operations and target audiences, with differences across industries and company sizes. Marketers can use these insights to optimise their online platforms, tailor content to their audiences and better achieve their business objectives. Ultimately, this study bridges the gap between theory and practise, providing real-world examples that illustrate the differences between theoretical concepts and actual business practises.

Based on the results obtained, companies should give more importance to content marketing and approach it strategically, taking into account all stages and understanding that it is a complex but necessary process. It is important to start with detailed market research, competitive analysis, existing and potential customers, their preferences and their own content marketing needs and expectations. Only once a solid foundation in terms of understanding the customers and the market has been established and a strategy developed can the organisation work towards achieving its own goals and create valuable content for the target audience. It is recommended to invest resources in online content marketing to promote quality change that will later lead to improved business operations, a better understanding of customers and the market needs in which they operate. It is important to emphasise education. Therefore, companies and their employees should invest in education about online marketing strategies and the creation of valuable content. With the growing influence of online content marketing, now is the ideal time to make effective changes.

CONCLUSIONS, RESEARCH LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Companies generally recognise the importance of online content marketing to their business, but many are not fully aware of the need for a strategic approach that considers all the necessary phases. While they recognise the value of content, they often do not have a full understanding of the characteristics that make content truly valuable. Without a strategic approach and a clear understanding of valuable content, one might question whether online content marketing really benefits their organisation. Whilst they agree that it is important, there is still much to be done in terms of education and effective implementation.

This study has certain limitations. While it was a qualitative approach that allowed for deep insights into the constructs and perceptions under investigation, it was based on only five interviews and relied on random selection. The companies involved vary considerably in terms of industry and size, which provides some perspective on the differences, but remains limited by the small sample size. Furthermore, the study was only conducted in one country (Croatia) and at a single point in time. Future research could be expanded by surveying more companies,

including a wider range of industries or focusing on a specific sector. It would also be beneficial to study companies of different sizes, such as small, medium or large companies, or to include companies from several countries in order to improve the generalisability of the findings. Further studies could also compare the perspectives of consumers and companies to identify gaps in perceptions and value. Using quantitative or mixed methods could provide a broader overview, while longitudinal studies could track changes over time, as digitalisation and trends in online content marketing are constantly evolving.

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Appendix: Interview – sample questions

1. What is the nature of your business?
2. Is your company present online?
3. Do you believe that your online presence brings you benefits? (e.g., sales, brand recognition, customer loyalty, information sharing, etc.) What are the main advantages you would highlight?
4. Do you consider online presence important for business success today?
5. Do you have a developed content marketing strategy that you implement online? How would you briefly describe the strategy you are implementing in this regard?
6. Do you undertake specific marketing activities related to creating online content?
7. What activities (what exactly) do you carry out in terms of online content creation?
8. Do you have pre-prepared content or do you act spontaneously?
9. Do you think it would be easier for you to create content if you planned it in advance?
10. Do you believe that online content marketing (in its various forms) should be carefully planned?
11. How much attention do you give to planning online content marketing, considering aspects such as goal setting, audience/target group selection, and the creation of a content marketing plan?
12. Do you consider the content marketing planning process more important than content preparation and distribution?
13. Do you create content yourself, or do you have a dedicated professional employed for that part of the business?
14. Do you know who your customers are? Their profile? Demographic, psychographic, and psychological data?
15. Do you collect data on your current and potential customers?
16. What does the process of creating or preparing online marketing content look like in your company?
17. How much time do you invest in content creation?
18. On which platforms/media do you share/communicate your online content?
19. What types of content do you create and share? (e.g., Text, Video, Photography, combinations, online flyers, e-newsletters, email messages, posts, podcasts...)
20. Why do you think customers should engage with your content?
21. Do you believe the online content you share provides added value to your customers?
22. How would you rate “valuable content” according to the following criteria (where the ratings mean: 1 – disagree, 2 – agree, 3 – don’t know)?

Valuable online content is:

- a. Useful (answers customer questions, serves a purpose for the customer) 1 2 3

- b. Timely (delivered to customers exactly when they need it) 1 2 3
- c. Unique/authentic 1 2 3
- d. Meaningful 1 2 3
- e. Created based on customer needs 1 2 3
- f. Relevant 1 2 3
- g. Delivers added value to customers 1 2 3
- h. Current 1 2 3
- i. Reliable 1 2 3
- j. Interesting 1 2 3
- k. Entertaining 1 2 3
- l. Has a 'story' 1 2 3

- 23. Do you believe that customers can recognize your valuable content? What makes you think so?
- 24. What type of online content do your customers respond to best? How do they respond?
- 25. What do you as a company aim to achieve through online content marketing?
- 26. Do you consider investments in online content marketing to be worthwhile for your company?
- 27. Are you satisfied with your current online content marketing strategy?
- 28. What would you change or are planning to change regarding your online content marketing strategy?

IDENTIFYING INDUSTRY NEEDS AND BARRIERS IN THE ADOPTION OF SMART TECHNOLOGIES IN ALBANIA'S HOSPITALITY SECTOR

Romina Muka¹, Tea Tavanxhiu² and Majlinda Godolja³

Abstract:

The rapid evolution of smart technologies presents significant opportunities for the hospitality sector, particularly in developing economies seeking to enhance operational efficiency and customer experiences. This study investigates the current landscape of technology adoption in Albania's accommodation industry, focusing on the challenges and opportunities that influence digital transformation. Through a series of six workshops held in key tourism hubs—Pogradec, Shkodra, Berat, Gjirokastra, Saranda, and Tirana—data were gathered via structured surveys targeting hotel managers and industry stakeholders. The findings reveal key barriers to adoption, including financial constraints, limited digital literacy, infrastructure deficiencies, and resistance to automation due to cultural and operational concerns. Conversely, opportunities for integration emerge in areas such as energy efficiency, guest experience personalization, and streamlined operational processes. The insights from this study serve as a foundation for the strategic implementation of smart hospitality technologies, contributing to a more sustainable and competitive tourism industry in Albania. Future research will expand on these findings by incorporating tourist perspectives to refine the proposed technological framework and assess consumer acceptance of smart hospitality solutions

Keywords: Smart Hospitality; Technology Adoption; Hotel Industry; Digital Transformation; Sustainable Tourism

INTRODUCTION

The hospitality industry globally is undergoing significant transformation driven by the integration of smart technologies such as Artificial Intelligence (AI), Internet of Things (IoT), and automation systems. These technologies enhance guest experiences, streamline operational efficiency, and foster sustainable business practices (Buhalis & Leung, 2018). However, despite their growing adoption worldwide, developing countries face distinct challenges, including high initial investment costs, inadequate infrastructure, insufficient digital literacy, and cultural resistance to technology-driven change (Ivanov & Webster, 2019).

In Albania, tourism has emerged as a pivotal economic sector, demonstrating steady growth in recent years (INSTAT, 2023). Nonetheless, the digital maturity of its hospitality sector remains limited, characterized by fragmented technology infrastructure and relatively low adoption rates of smart hospitality solutions. There is a significant gap in existing literature regarding a comprehensive understanding of the barriers and specific needs of the Albanian hospitality industry concerning digital transformation.

This study aims to fill this gap by systematically investigating the current technological landscape in Albania's accommodation sector. Specifically, the research explores industry readiness, identifies the primary needs and barriers, and evaluates opportunities that could facilitate the adoption of smart technologies. By addressing these critical dimensions, this paper contributes to both academic understanding and practical strategic implementation tailored specifically for the Albanian context.

The subsequent sections of this paper are structured as follows: Section 2 provides a detailed literature review highlighting global and regional insights; Section 3 outlines the methodological approach; Section 4 presents empirical results and discussions derived from surveys and workshops conducted across key tourism regions; Section 5 offers strategic recommendations based on the findings; and finally, Section 6 concludes with implications, limitations, and suggestions for future research.

LITERATURE REVIEW

Smart technologies have increasingly become central to enhancing operational efficiency, guest experiences, and sustainability in the hospitality industry (Buhalis & Leung, 2018). The integration of technologies such as Artificial Intelligence (AI), Internet of Things (IoT), and automation systems enables hotels to deliver personalized services, streamline operational workflows, and manage resources more sustainably (Neuhofer, Buhalis & Ladkin, 2015; Ivanov & Webster, 2019).

In recent years, the adoption of smart technologies in hospitality has shown significant potential for enhancing guest satisfaction through predictive analytics, personalized experiences, and seamless interactions (Buhalis et al.,

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2022). Technologies like automated room control systems, mobile applications for guest interaction, and AI-based customer relationship management (CRM) have improved service delivery while reducing operational costs (Ivanov & Webster, 2017; Law, Buhalis & Cobanoglu, 2014).

Despite these recognized advantages, several barriers significantly limit the widespread adoption of smart hospitality technologies, particularly in developing countries. Previous research identifies key constraints such as high initial investment costs, lack of infrastructure, and insufficient staff training and digital literacy (Okumus, Altinay & Chathoth, 2019). Additionally, resistance to change due to cultural preferences and concerns about reduced human interaction continues to pose challenges (Ivanov, Gretzel, Berezina, Sigala & Webster, 2019).

In the context of developing regions, studies show that fragmented technology infrastructure and limited regulatory frameworks further complicate technology integration, resulting in slower adoption rates compared to developed countries (Alrawadieh, Cetin, Dincer & Dincer, 2020). Specifically, in the Western Balkans, including Albania, there is a notable gap in systematic research addressing local contexts of smart technology adoption in hospitality, despite increasing tourism activity (UNWTO, 2020).

Recent regional studies have begun to address this gap. Naco, Millo, and Sevrani (2025) investigate how Albanian accommodation providers are navigating the ethical, cultural, and operational dimensions of AI implementation, emphasizing the importance of culturally aligned strategies for digital transformation. Similarly, Godolja, Sevrani, and Millo (2025) highlight how the post-COVID period has served as a catalyst for innovation in the hotel industry across developing countries, including Albania, identifying emerging digital needs and proposing recovery strategies based on smart technologies.

In addition to empirical insights, theoretical models provide structured explanations for how and why organizations adopt new technologies. The Technology Acceptance Model (TAM) (Davis, 1989) posits that two key factors—perceived usefulness and perceived ease of use—drive an individual's intention to adopt a technology. This model has been widely applied in hospitality studies to explain variations in technology uptake across different user groups. Complementarily, Diffusion of Innovation Theory (Rogers, 2003) frames technology adoption as a social process, emphasizing the role of communication channels, organizational culture, and the innovation-decision process in shaping the spread of new technologies. Both models offer useful lenses through which to interpret the dynamics of smart technology adoption in the Albanian hospitality context, particularly in understanding resistance to change, awareness gaps, and the influence of peer learning across accommodation structures.

Building on this theoretical and empirical foundation, the present study focuses specifically on Albania, with the aim of identifying local needs and barriers to smart technology adoption. This localized analysis is crucial given Albania's distinct economic, infrastructural, and socio-cultural characteristics that shape its digital transformation trajectory in tourism.

Through a contextualized review of both global and regional literature, this research provides a framework for interpreting local findings and generating practical recommendations tailored to the Albanian hospitality ecosystem.

METHODOLOGY

This research employs a mixed-methods approach, integrating qualitative workshops with quantitative surveys, to thoroughly explore the complexities associated with smart technology adoption in Albania's hospitality sector. The mixed-methods design captures comprehensive insights into industry practices, barriers, perceptions, and readiness for digital transformation.

Data Collection

Data for this study were collected through structured workshops organized across six major tourism regions in Albania: Pogradec, Shkodër, Berat, Gjirokastër, Sarandë, and Tirana. These locations were strategically selected due to their relevance to national tourism activity, ensuring a diverse and representative sample of accommodation providers. The data collection process was conducted between March and May 2025, combining survey administration with facilitated group discussions.

Participants in the workshops included hotel owners, managers, and hospitality professionals, selected to reflect diversity in property size, management structure, and levels of technological integration. The workshops followed a semi-structured format, combining an initial introduction to smart hospitality technologies with guided discussion prompts and a self-administered questionnaire. The facilitation team used a Design Thinking approach to encourage open dialogue and idea sharing, while also capturing structured feedback on current practices, challenges, and innovation readiness.

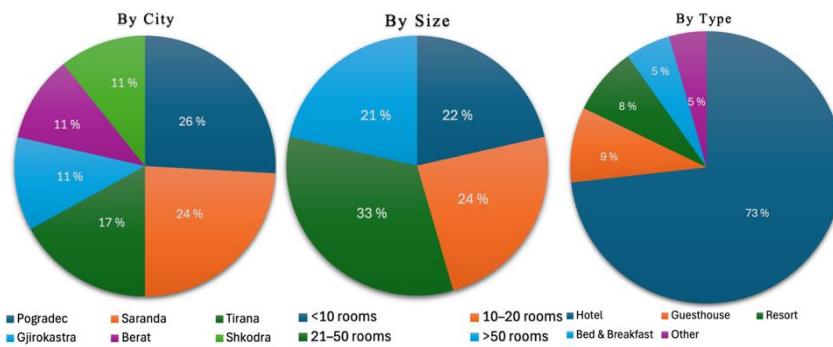


Figure 9. Sample Composition by City, Structure Size, and Accommodation Type.

The final sample consisted of 112 respondents representing accommodation structures across the six cities. Distributions are illustrated in Figure 1, which summarizes the composition of the sample by city, structure size, and accommodation type. The largest share of responses came from Pogradec (25.9%), followed by Saranda (24.1%), Tirana (17.0%), Gjirokastra (11.6%), Berat (10.7%), and Shkodra (10.7%).

The sample encompasses a variety of accommodation types. Hotels constituted the majority with 73.2% (n=82) of respondents, followed by guesthouses at 8.9% (n=10), resorts at 8.0% (n=9), and bed & breakfast structures at 5.4% (n=6). A smaller share was composed of other types, including apartments, boutique lodgings, and hybrid forms (4.5%, n=5).

With regard to the size of the accommodation facilities, 21.4% (n=24) of respondents represented small structures with fewer than 10 rooms, while 24.1% (n=27) managed medium-sized structures with 10 to 20 rooms. A significant portion, 33.0% (n=37), operated medium-to-large structures with 21 to 50 rooms, and 21.4% (n=24) represented large structures with more than 50 rooms.

This sample composition ensures that the study captures a comprehensive cross-section of Albania's hospitality sector, providing a solid empirical foundation for analyzing smart technology trends, needs, and constraints across different types of tourism accommodations and geographic contexts.

Data Analysis

Quantitative data obtained from surveys were systematically analyzed using descriptive statistics to measure technology adoption rates, frequency of identified barriers, and levels of interest in various smart technologies. Qualitative insights derived from workshop discussions were analyzed thematically, employing a Design Thinking framework to identify recurring themes and patterns related to stakeholder needs, concerns, and opportunities for technological innovation.

To ensure reliability and validity, triangulation of data was applied by cross-verifying qualitative and quantitative findings. Additionally, peer debriefing and member-checking procedures were implemented to validate findings and interpretations.

RESULTS AND DISCUSSION

This section presents the empirical findings of the study, drawn from surveys and workshops conducted with hospitality providers across key tourism regions in Albania. The analysis is structured around four thematic areas: technology adoption levels, city-specific comparisons, perceived barriers, and identified needs and opportunities for smart technology integration.

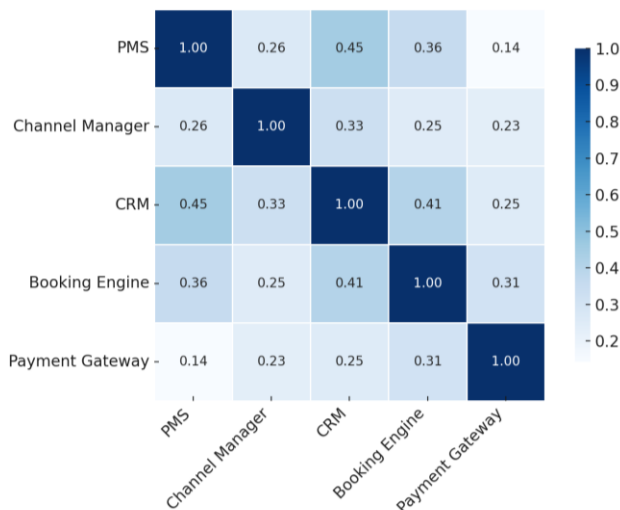


Figure 10. Correlation Matrix of Core Hospitality Technologies.

Technology Adoption Landscape

The adoption of smart technologies across Albania's hospitality sector reveals a layered progression, from foundational management systems to more advanced automation and AI-driven solutions. This section synthesizes adoption patterns and inter-technology relationships, using both statistical analysis and structured visualizations. At the core of digital operations are systems such as Property Management Systems (PMS), Channel Managers, Booking Engines, Customer Relationship Management (CRM) platforms, and Online Payment Gateways. These tools are critical for operational control, guest interaction, and revenue management. Correlation analysis among these technologies reveals statistically significant associations that underscore their complementary nature.

To better understand the interdependencies between systems, a Pearson correlation analysis was conducted. As shown in Figure 2, a strong and statistically significant correlation was observed between PMS and CRM adoption ($r = 0.451$, $p < 0.0001$), suggesting that properties adopting centralized management solutions are more likely to also invest in customer engagement tools. A moderate correlation exists between Booking Engines and Payment Gateways ($r = 0.309$, $p = 0.0009$), reflecting the logical pairing of direct booking and payment facilitation. Additionally, a weaker but significant correlation was identified between PMS and Channel Managers ($r = 0.264$, $p = 0.0049$), showing that distribution management tools often accompany internal reservation systems. These relationships suggest that digital adoption is not random but rather shaped by functional integration and strategic alignment.

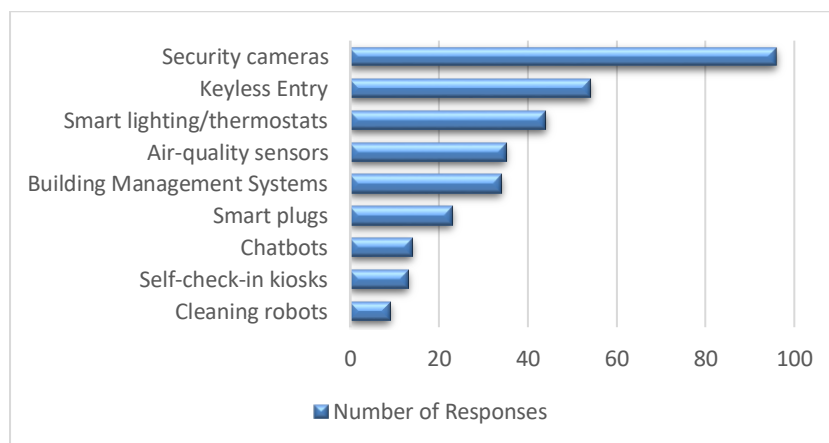


Figure 11. Adoption Rates of Smart/IoT Devices in the Albanian Hospitality Sector

Moving beyond core systems, Figure 3 presents the adoption rates of Smart/IoT devices commonly used to automate operational and guest-facing services. Security cameras emerged as the most widely adopted device, highlighting a strong emphasis on safety. This is followed by keyless entry systems, smart thermostats and lighting, and room control systems, which reflect the growing role of comfort and energy management in enhancing guest experience. Devices such as self-check-in kiosks, cleaning robots, and air-quality sensors are less commonly

adopted, likely due to their higher cost or novelty. Smart plugs and building management systems (BMS) represent mid-level adoption tools that indicate early stages of infrastructure automation.

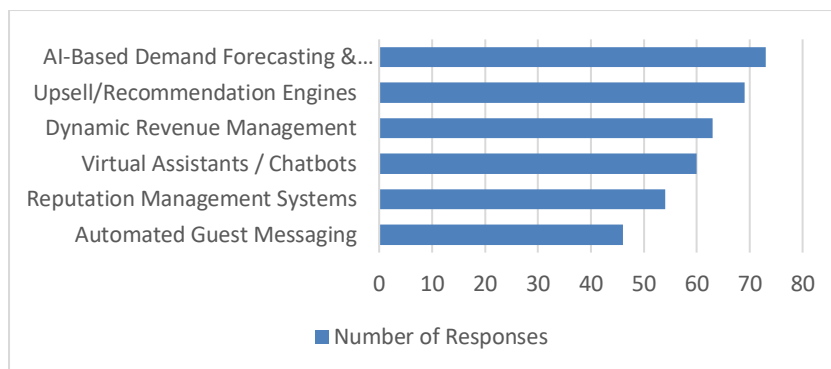


Figure 12. Adoption Rates of AI-Driven Modules in the Albanian Hospitality Sector

Figure 4 highlights six AI modules that respondents consider important for future integration. The highest priorities include AI-based demand forecasting, upsell/recommendation engines, and dynamic revenue management, suggesting a strong focus on data-driven planning and profitability. In contrast, guest-facing tools such as virtual assistants/chatbots and automated messaging systems were less emphasized, indicating a shift toward back-end optimization as a near-term priority.

In summary, the digital transformation of Albania's hospitality sector reflects a structured evolution. Accommodation providers are steadily implementing foundational systems and selectively adopting smart devices that enhance safety, energy efficiency, and operational control. Looking ahead, there is a clear strategic interest in AI-powered tools—particularly those that support demand forecasting, pricing, and revenue optimization. This progression highlights a shift from basic digitalization to more intelligent, data-driven decision-making aimed at long-term competitiveness and sustainability.

City-Level Comparisons

To explore how digital transformation varies geographically within Albania, this section analyzes data from six key tourism cities: Tirana, Saranda, Pogradec, Gjirokastra, Shkodra, and Berat. The analysis considers three interconnected aspects of smart technology adoption—co-adoption of core systems, uptake of Smart/IoT devices, and perceived priorities for future AI integration. These comparative insights provide a clearer understanding of regional dynamics in technological advancement within the hospitality sector. To mitigate the effects of varying response rates across locations, adoption frequencies for both Smart/IoT devices and AI integration priorities were normalized by the number of respondents in each city.

Pearson correlation coefficients and corresponding p-values were calculated to evaluate the relationships between three critical pairs of digital tools: Property Management System (PMS) and Channel Manager, PMS and Customer Relationship Management (CRM), and Booking Engine and Payment Gateway. The results reveal notable differences in how technologies are adopted across cities. Tirana exhibits the most coherent integration strategy, with statistically significant correlations across all three pairs (PMS–Channel Manager: $r = 0.57$, $p = 0.0102$; PMS–CRM: $r = 0.46$, $p = 0.0482$; Booking Engine–Payment Gateway: $r = 0.46$, $p = 0.0482$). These figures suggest that businesses in the capital are more likely to adopt systems in tandem, enhancing overall operational efficiency. In Pogradec, PMS–Channel Manager ($r = 0.38$, $p = 0.0406$) and PMS–CRM ($r = 0.35$, $p = 0.0642$) correlations are also noteworthy, indicating emerging patterns of digital integration. In contrast, Shkodra shows a strong negative correlation between PMS and Channel Manager ($r = -0.60$, $p = 0.0402$), which may indicate inconsistencies in digital strategy or redundant system adoption. Saranda and Berat display weak and statistically insignificant correlations, potentially due to fragmented digital implementation or the use of non-integrated solutions. These findings highlight the relevance of coordinated investment strategies, particularly in mid-sized cities where adoption appears more erratic.

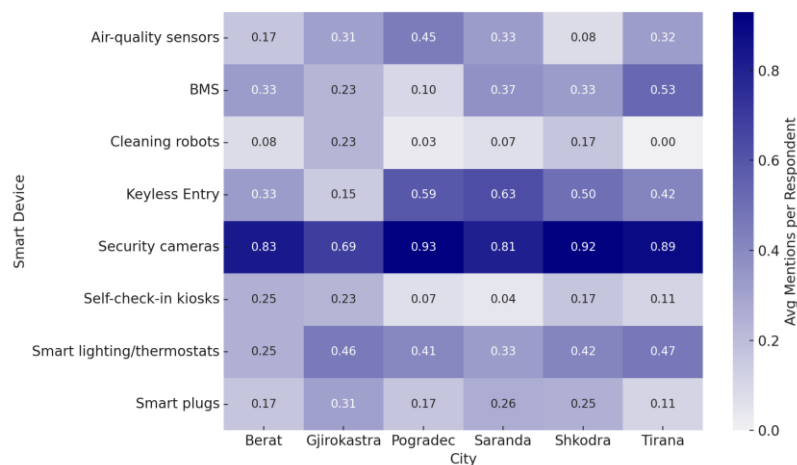


Figure 13. Adoption Rates of Smart/IoT Devices per Respondents by City.

The normalized analysis of Smart/IoT device usage reveals Tirana as the leading city in terms of technology intensity per accommodation unit. As shown in Figure 5, Tirana exhibits the highest average mentions per respondent for building management systems, smart plugs, and room control systems, reflecting a mature infrastructure oriented toward automation and energy management. Saranda and Gjirokastra also show diversified Smart/IoT adoption, particularly in keyless entry, air-quality sensors, and lighting systems, indicating balanced investment in guest experience and environmental monitoring. Pogradec, despite high absolute device counts, ranks lower in per-structure usage. Shkodra and Berat present the lowest normalized adoption, with uptake limited mainly to basic security technologies. The heatmap in Figure 5 visually highlights these contrasts, where darker shades correspond to higher per-respondent usage rates across device categories.

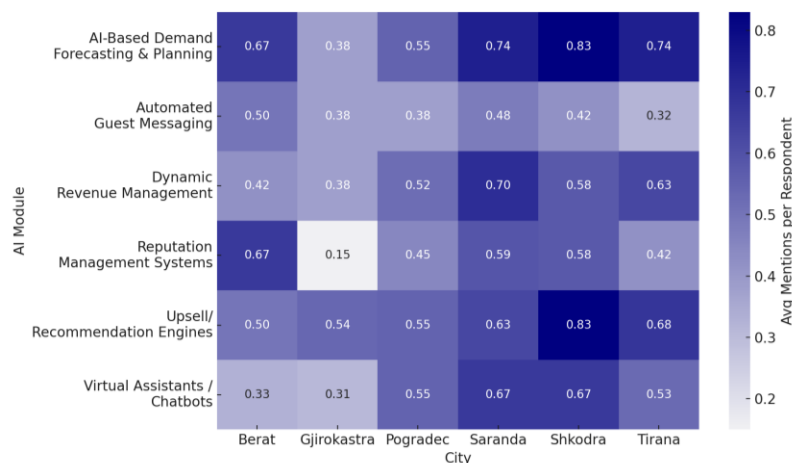


Figure 14. Adoption Rates of AI-Driven Modules per Respondents by City.

City-level preferences for AI integration exhibit a similar pattern of stratification. As illustrated in Figure 6, Tirana again leads with the most consistent prioritization of advanced tools such as AI-based forecasting, dynamic revenue management, and recommendation engines, reflecting a strategic focus on operational optimization. Saranda and Gjirokastra demonstrate moderate but balanced interest across both guest-facing and optimization technologies, including automated messaging and reputation management systems. In contrast, Shkodra, Berat, and Pogradec place greater emphasis on chatbots and automated communication, with limited prioritization of AI modules linked to data-driven decision-making. These differences suggest distinct stages of AI readiness across cities, and are made visible in the heatmap in Figure 6, where darker cells indicate higher average prioritization per respondent.

In summary, the city-level comparison highlights significant disparities in the intensity and integration of smart technologies within Albania's hospitality sector. Tirana consistently emerges as the most digitally mature city, demonstrating strong technological interdependencies, the highest per-respondent adoption of Smart/IoT devices, and advanced AI integration priorities. Saranda and Gjirokastra follow with well-rounded digital engagement, combining environmental and guest-facing technologies with balanced interest in AI modules. Pogradec, despite high absolute adoption figures, displays lower per-structure intensity when normalized. Shkodra and Berat remain in early stages of digital transformation, characterized by limited adoption of core systems and basic automation

tools. These findings, supported by Figures 3 and 4, underscore the need for tailored strategies to support region-specific digital development pathways within Albania’s evolving tourism ecosystem.

Barriers to Smart Tech Adoption

Although the potential of smart technologies in enhancing operational efficiency and customer service is widely acknowledged, their implementation in the Albanian hospitality sector remains limited. Survey and workshop findings highlight a diverse range of obstacles that hinder the adoption of digital solutions by accommodation structures.

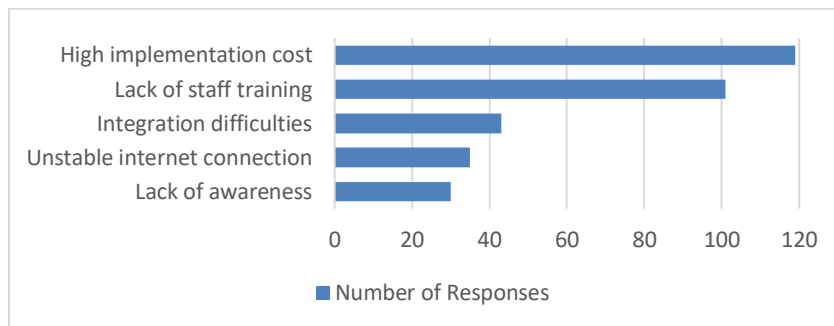


Figure 15. Grouped Barriers to Smart Technology Adoption.

While the potential of smart technologies to enhance operational efficiency and service quality in tourism is widely recognized, their adoption within Albania’s hospitality sector remains limited and uneven. To better understand the underlying constraints, survey respondents were asked to indicate the main challenges they face in integrating smart and AI-driven technologies into their business operations.

This question allowed for multiple selections, meaning each respondent could identify more than one barrier. Consequently, although 112 individuals completed the survey, the analysis yielded 330 total mentions of barriers. To ensure analytical clarity, all responses were categorized using a keyword-based thematic classification, which grouped semantically similar expressions under broader barrier categories. The aggregated results are summarized in Figure 7.

The most commonly cited challenge was the high cost of implementation, with 119 mentions. This barrier encompasses direct references to purchase costs, licensing fees, maintenance expenses, and general financial inaccessibility—particularly salient for small and medium-sized enterprises operating on tight margins.

The second most frequently reported issue was lack of staff training, noted in 101 responses. This includes gaps in basic digital literacy, lack of exposure to smart systems, and insufficient access to professional development resources. Even in cases where technology was present, its underutilization was often attributed to internal capacity limitations.

Integration difficulties were cited 43 times, reflecting technical incompatibilities between existing legacy systems and new digital tools. These complexities act as a deterrent to adoption, especially in businesses without in-house IT expertise.

The issue of unstable internet connectivity was highlighted in 35 responses, primarily from semi-urban and rural areas. This barrier directly undermines trust in cloud-based services and real-time digital operations, making businesses reluctant to depend on online tools.

In 30 instances, respondents identified a lack of awareness regarding the benefits and functionalities of smart technologies. This perceptual constraint is particularly common among traditional businesses or those operating in lower-demand areas.

In summary, these findings demonstrate that the adoption of smart technologies in Albanian hospitality is impeded by a confluence of financial, technical, organizational, and perceptual challenges. Importantly, perceptions surrounding the return on investment play a pivotal role in shaping decision-making processes. A multi-level response—including financial incentives, workforce training, demonstration projects, and targeted awareness campaigns—is essential for fostering a more inclusive and sustainable digital transformation.

Identified Needs and Opportunities

In addition to exploring barriers, the study also assessed the current technological aspirations of hospitality businesses in Albania. Understanding these needs is essential for designing targeted interventions and promoting scalable, context-appropriate innovations. Participants were invited to indicate which types of technologies, tools, or support services they believed would most benefit their accommodation structures.

Responses revealed a strong and multifaceted demand for digital solutions. As the survey allowed for multiple selections, the total number of mentions exceeded the number of individual respondents. To ensure analytical clarity, responses were grouped into thematic categories. The five most frequently cited priority areas are presented in Figure 8.

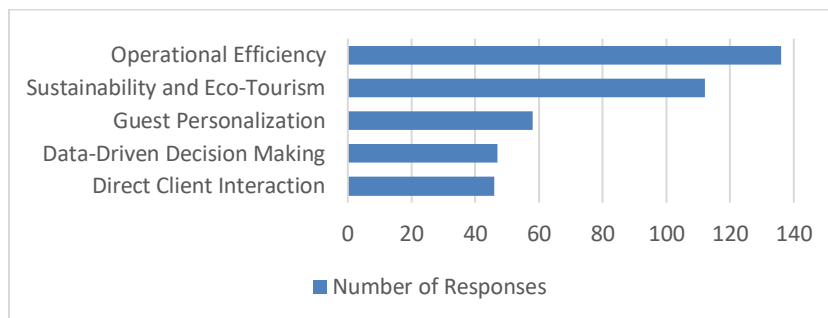


Figure 16. Grouped Priority Areas for Smart Technology Integration.

The most prominent category was operational efficiency, with 136 total mentions. Respondents expressed a need for integrated Property Management Systems (PMS), smart environmental control systems, and building automation tools to streamline internal operations and reduce costs.

Closely following was sustainability and eco-tourism, with 112 responses. Many accommodation providers recognized the potential of smart technologies to reduce energy and water consumption, improve waste management, and contribute to environmentally responsible practices—especially important in a sector increasingly driven by eco-conscious travelers.

Guest personalization was also a notable concern, with 58 mentions. Technologies such as Customer Relationship Management (CRM) systems and guest messaging platforms were highlighted as tools that can enhance service quality, increase loyalty, and enable tailored marketing strategies.

Data-driven decision making received 47 mentions. Respondents showed interest in analytics platforms and AI-powered tools that could support forecasting, performance evaluation, and strategic planning.

Finally, direct client interaction—with 46 mentions—was identified as a key opportunity. There is growing interest in reducing dependency on third-party platforms by developing direct booking engines and enhancing website functionality, particularly through mobile-friendly solutions.

These results indicate that accommodation providers in Albania are not only aware of the strategic value of smart technologies but are actively seeking practical tools that align with their operational and strategic goals. The needs span infrastructure, software, analytics, and human capital, highlighting the importance of integrated and customizable digital solutions.

STRATEGIC RECOMMENDATIONS

Based on the findings of this study, several actionable strategies are proposed to facilitate the adoption and meaningful integration of smart technologies in Albania's hospitality sector. These recommendations address the financial, technical, organizational, and perceptual barriers identified across cities and accommodation types.

First, a tiered financial support scheme is needed to reduce the perceived risk and upfront cost of smart technology investments. Governmental bodies and donor organizations could provide co-financing instruments, tax incentives, or low-interest digitalization loans targeted at small and medium-sized enterprises, which constitute the majority of Albania's accommodation structures.

Second, capacity-building programs should be prioritized to address gaps in digital literacy and operational know-how. Training initiatives tailored for hospitality staff and managers should focus on practical usage of core systems (e.g., PMS, CRM) and new tools (e.g., AI modules, environmental sensors). Partnerships with universities, vocational institutes, and industry associations can ensure that such programs are locally grounded and scalable.

Third, demonstration projects and pilot implementations should be launched to showcase the return on investment (ROI) of smart solutions in local contexts. By tracking outcomes such as energy savings, improved occupancy, or labor efficiencies, these pilots can build trust and reduce uncertainty among hesitant adopters.

Fourth, public awareness campaigns can help promote the value of smart hospitality beyond the managerial level. Highlighting real-life success stories and the experiences of digitally advanced structures can foster peer learning and community-level interest.

Finally, regional strategies should be customized based on city-level maturity. For example, Tirana could serve as a hub for advanced AI experimentation, while regions like Berat and Shkodra may benefit more from basic infrastructure upgrades and bundled integration services. Such differentiation will ensure more inclusive and sustainable digital growth across the national tourism ecosystem.

CONCLUSION AND FUTURE WORK

This study provides a comprehensive analysis of the current state of smart technology adoption in Albania's hospitality sector, identifying both key barriers and emerging opportunities. Drawing on a robust dataset collected through surveys and workshops across six major tourism cities, the research highlights how financial constraints, technical limitations, and organizational capacity gaps intersect to shape digital readiness. The findings also reveal significant variation across regions, with Tirana, Saranda, and Gjirokastra leading in adoption intensity and strategic alignment, while others remain at earlier stages of transformation.

Importantly, the study underscores the need for integrated policy interventions that simultaneously address infrastructure, capacity, and confidence. Strategic recommendations emphasize the role of financial instruments, skills development, and localized experimentation to drive adoption. These insights contribute not only to the academic understanding of digital transformation in emerging tourism markets, but also offer practical guidance to policymakers and industry stakeholders.

Future research will expand on these insights by incorporating the perspectives of tourists to better understand their expectations, willingness to engage with smart services, and perceptions of digital experiences. Additionally, comparative studies across neighboring Western Balkan countries could further contextualize Albania's trajectory and inform cross-border collaboration on smart tourism innovation.

ACKNOWLEDGEMENT

This research was supported by the National Agency for Scientific Research and Innovation of Albania (AKKSHI). Any use of generative AI in this manuscript adheres to ethical guidelines for use and acknowledgement of generative AI in academic research, as outlined in this manuscript. Each author has made a substantial contribution to the work, which has been thoroughly vetted for accuracy, and assumes responsibility for the integrity of their contributions. (Porsdam et al., 2024).

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LEVERAGING GREEN AND DIGITAL INNOVATIONS FOR URBAN MOBILITY ENTREPRENEURSHIP IN AFRICA: A SYSTEMATIC REVIEW OF EMERGING TRENDS AND OPPORTUNITIES

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Abstract::

African urban mobility systems are confronting swift transformation, driven by the collective influences of digital disruption and sustainable innovation. These movements offer notable opportunities for entrepreneurship, particularly for small and medium-sized firms (SMEs) pursuing to innovate inclusive and sustainable mobility solutions. This study dispenses a systematic literature review of 68 peer-reviewed articles, complimented by a bibliometric co-occurrence network analysis, to synthesize prevailing research themes, conceptual conflicts, and emerging opportunities influencing sustainable urban mobility entrepreneurship in African cities. The review depicts three interrelated thematic clusters: digital disruption, innovations in green mobility, within urban mobility, and the overall influence of entrepreneurial ecosystems towards the stimulation or obstruction of innovation adoption. The findings amplify the current understanding by combining entrepreneurship and innovation outlooks, opposing the predominant metropolitan emphasis by underlining the undiscovered capacity of secondary cities, and providing novel theoretical insights into how resource-limited ecosystems can propel context-specific and scalable urban mobility solutions. The report highlights the prerequisite of strengthening collaborative-stakeholder engagement, promoting financial accessibility and digital infrastructure, and formulation of legal frameworks that address local entrepreneurial requirements. The paper concludes by delineating a focused research agenda that handles inadequacy in the comprehension of ecosystem dynamics, governance legal frameworks, and methodological plan of actions, furnishing actionable insights for policymakers, researchers, and practitioners seeking to enhance inclusive and sustainable mobility outcomes within African contexts.

INTRODUCTION

Africa's urban transport systems are undergoing profound change at a critical historical moment. The continent is experiencing unprecedented rates of urbanization, with projections showing that cities will accommodate an additional 950 million people by 2050 (Oduwaye et al., 2024). This population surge creates urgent pressure to design and implement sustainable, inclusive, and efficient transport infrastructure across diverse urban settings. Yet, many African cities continue to face long-standing and complex transportation challenges. These include aging and insufficient infrastructure (Agunbiade et al., 2024), chronic traffic congestion, worsening air pollution (Poku-Boansi, 2022), limited access to affordable and reliable mobility options (McKay et al., 2024), and rising carbon emissions (African Development Bank, 2021; Cinderby et al., 2024).

Such systemic problems weaken urban productivity, erode quality of life, and threaten national commitments to achieving the Sustainable Development Goals (SDGs) and climate targets under the Paris Agreement (United Nations, 2015; IPCC, 2021). In response to these mounting pressures, a wave of green and digital mobility innovations has emerged, offering transformative possibilities for reimagining urban mobility in Africa. These innovations not only offer environmental benefits but also signal new economic opportunities and more inclusive mobility pathways (Pawlak et al., 2023).

Green innovations such as electric vehicles, solar-powered public buses, and non-motorized transport infrastructure represent key strategies for achieving low-carbon, environmentally sustainable urban systems (Punitham & Udhaya Jothi, 2025). For instance, a study conducted in Atibaia, Brazil, documented a reduction of 30,788.70 tons of greenhouse gas emissions over a five-year period due to electric vehicle usage (De Abreu et al., 2023), underscoring the environmental potential of such solutions. At the same time, digital innovations are reshaping how people and goods move within cities, enhancing both sustainability and operational efficiency (Fatorachian et al., 2025; Nikitas et al., 2024).

Examples include app-based ride-hailing services, e-logistics systems, Mobility-as-a-Service (MaaS), and real-time information platforms that allow users to plan and track their journeys more effectively (Bousia & Nathanail, 2025; Syamala et al., 2023). MaaS platforms, in particular, are designed to improve travel coordination and convenience by integrating diverse mobility services through digital tools (Wang et al., 2024). These technologies can reduce costs, improve access, and enable the creation of new business models tailored to urban environments (Dzisi et al., 2022; Oberoi, 2024). Notably, small, and medium-sized enterprises (SMEs) and local startups are increasingly taking the lead in deploying these innovations, using them to respond to localized mobility needs that are often overlooked by large, centralized service providers (Howard et al., 2022; Ziyae & Zali, 2017).

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However, despite the growing adoption of these solutions, their uptake across African cities remains inconsistent and uneven. Some urban areas have introduced electric bus fleets or initiated smart mobility pilots (Moumni et al., 2023), while others are constrained by fragmented policy regimes (Balashova et al., 2025), limited access to funding (Kayisu et al., 2024), poor infrastructure (Domingo et al., 2023), and weak institutional coordination (Balashova et al., 2025; Bessala et al., 2023). Additionally, the digital divide between rural and urban populations deepens socio-spatial inequalities, limiting widespread participation in emerging mobility systems (Jieutsa et al., 2023).

A further complication is that most international literature on sustainable mobility remains heavily biased toward Global North contexts, with only a limited number of studies focusing on Africa-specific challenges and opportunities (Agyei et al., 2024; Kamana et al., 2024). Much of the existing research tends to isolate single innovations in capital cities or large urban centers. This approach fails to capture broader patterns, regional contrasts, or the systemic barriers that confront smaller and medium-sized African cities (Jiang et al., 2025). As a result, urban stakeholders such as policymakers, entrepreneurs, planners, and development agencies lack a coherent and evidence-based framework to guide innovation, investment, and implementation (Kamana et al., 2024; Kiribou et al., 2024; UN-Habitat, 2024).

This paper addresses these knowledge gaps by conducting a comprehensive systematic review focused exclusively on African cities. The goal is to understand how green and digital mobility innovations are being implemented, the conditions that enable or constrain their success, and the implications for inclusive urban development. Specifically, the study is guided by the following research questions:

- **RQ1:** What types of green and digital innovations are being implemented in African urban mobility systems?
- **RQ2:** What enabling ecosystems such as policy frameworks, financing mechanisms, governance structures, and community engagement support or hinder these innovations?
- **RQ3:** What are the key challenges, contradictions, and opportunities for scaling sustainable and inclusive urban mobility innovations across African contexts?

To answer these questions, the study evaluates 126 peer-reviewed publications from 2012 to 2024, drawing from empirical studies, conceptual frameworks, and applied case studies in the domains of innovation, entrepreneurship, and sustainability. A conceptual framework is developed to connect entrepreneurial innovation, ecosystem enablers, and urban mobility outcomes (Barney, 1991; Teece, 2007). This framework helps to interpret how different combinations of technical, financial, and institutional capacities shape mobility transitions in diverse African settings.

The findings aim to offer practical insights for decision-makers, including policymakers crafting responsive regulations, SMEs seeking to scale mobility ventures, urban planners integrating new technologies, and development partners investing in climate-resilient infrastructure (OECD, 2020; UN-Habitat, 2022).

Crucially, this study adopts an African-centered lens to avoid replicating models from Europe, North America, or East Asia that may not align with regional realities (UN-Habitat, 2024). African cities face unique challenges such as the prominence of informal transport, fragile infrastructure, pronounced inequality, and governance limitations that demand context-sensitive innovation strategies (Mitullah, 2024; Kamana et al., 2024).

By emphasizing these African experiences, this paper contributes to closing a major gap in the global mobility discourse and helps reframe urban transformation narratives through the lens of African innovation, adaptation, and resilience (Bevilacqua et al., 2023).

The rest of the manuscript is structured as follows: Section 2 reviews the relevant literature, summarizing key concepts, theoretical perspectives, and empirical findings. Section 3 outlines the methodology, including review protocols, search criteria, and analysis techniques. Section 4 presents the major results and thematic clusters. Section 5 interprets the findings in light of theory and practice. Finally, Section 6 offers conclusions, policy recommendations, and priorities for future research.

LITERATURE REVIEW

The surge in attention toward sustainable and digital mobility innovations has led to a rapidly expanding body of scholarship, spanning themes such as green technologies, entrepreneurial ecosystems, and inclusive transport solutions. This section synthesizes that literature by identifying dominant trends, theoretical tensions, and persistent gaps particularly those relevant to the evolution of African urban mobility entrepreneurship.

Green and digital innovations are increasingly central to restructuring urban mobility systems around the globe, especially in response to climate change imperatives and sustainability goals. Contemporary studies emphasize the critical role of emerging technologies such as electric vehicles, smart infrastructure, alternative fuels, and app-based mobility platforms. These innovations seek to minimize environmental impact while maintaining accessibility and service efficiency (Jain et al., 2025). Hariram et al. (2025) extend this discussion by focusing on

cutting-edge mobility technologies, such as hyperloops and flying cars, highlighting how futuristic propulsion systems could revolutionize sustainable transport across multiple modalities, including road, rail, air, and maritime. In African contexts, scholars have begun to examine both the promises and limitations of these innovations. Longe (2022), for example, compares electric and internal combustion vehicles, finding that while e-mobility holds potential, adoption is slowed by high costs, limited public charging infrastructure, and weak policy support. This aligns with Bikam (2021), who, drawing on data from Limpopo Province in South Africa, argues that Africa's green transport transition will require a hybrid approach combining fuel-efficient systems, renewable energy solutions, and context-sensitive policies. Similarly, Andersen et al. (2022) observe that Kenyan enterprises are increasingly pursuing green and circular innovation, motivated by both environmental and economic considerations. However, they caution that such innovations are often insufficiently integrated into mainstream policy agendas, reducing their broader impact.

Despite these encouraging developments, much of the existing literature remains heavily focused on technological capabilities or national-level policies. There is limited research on how green and digital mobility innovations are embedded within the day-to-day operations of small and medium-sized enterprises (SMEs) in African cities. This disconnects results in fragmented knowledge about the institutional and entrepreneurial conditions that influence success or failure in innovation adoption. To fill this gap, the current study synthesizes African-focused research to extract cross-cutting insights, conceptual tensions, and underexplored constraints. It also aims to offer a holistic framework that captures the interdependence between sustainability, entrepreneurship, and mobility system transformation.

Digital disruption, in particular, has become a defining feature of urban mobility evolution across Africa. App-based ridesharing, vehicle automation, e-logistics, and smart ticketing platforms are increasingly transforming how people and goods are moved across cities. Hodson et al. (2024) show how digital platforms adjusted during the COVID-19 pandemic, quickly adapting to mobility restrictions and social distancing rules. In a similar vein, Ebaidalla (2025) examines how North African firms embraced digitalization as a survival strategy during the crisis, noting a surge in digital mobility adoption across industries. These findings illustrate the resilience and adaptability of African innovation ecosystems during periods of systemic shock.

Beyond pandemic responses, broader shifts in "New Mobility" are driven by automation, electrification, and big data. These trends raise complex questions about public governance, user equity, and digital infrastructure (Thurlow & Sawyer, 2021). Acheampong (2022), using empirical data from Ghana, highlights both the appeal and limitations of app-based services, pointing to diverging travel patterns, user profiles, and perceptions of safety. Meanwhile, Baudens et al. (2025) identify significant barriers to adoption in Kinshasa, including affordability challenges, underdeveloped digital infrastructure, and perceived insecurity in public spaces. Together, these studies offer a nuanced view of how digital technologies are reshaping urban mobility in ways that are deeply uneven and context specific.

Although the literature increasingly recognizes the potential of digital transformation, it often underrepresents the agency of local entrepreneurs in shaping these innovations. Much of the focus remains on consumer-side adoption or government regulation, while the role of SMEs in localizing, scaling, or customizing digital platforms is underexplored. This study seeks to bridge that disconnect by centering the role of African entrepreneurs in deploying digital and green mobility innovations to solve local transport challenges.

In recent years, scholarship has also turned its attention toward the entrepreneurial ecosystems that underpin innovation in African cities. Aday et al. (2023) explores how institutional voids, financing gaps, and youth-driven business incubators interact with the African Union's Agenda 63. They argue that mobilizing talent and building innovation capacity are key enablers for entrepreneurial growth. Kolade et al. (2021), in their contribution to the Palgrave Handbook of African Entrepreneurship, examine how urban ecosystems are evolving under the pressure of technological change and financial innovation. Their work contrasts urban hubs of high-tech growth with peripheral or conflict-affected regions, highlighting the diversity and unevenness of entrepreneurial landscapes. Moser et al. (2022) add another layer to the debate by focusing on foreign investments and Africa's emerging "new cities," showing how externally funded urban mega-projects can both enable and constrain local entrepreneurial opportunity.

When these studies are viewed together, a shared insight emerges while African entrepreneurial ecosystems are dynamic and adaptive, they vary widely in their internal structures and external influences. Aday et al. stress internal institutional and managerial reform; Kolade et al. focus on diversity and adaptation across regions; and Moser et al. underscore the geopolitical influence of global capital flows on urban transformation. This convergence and divergence illustrate the importance of multi-scalar thinking in understanding African innovation ecosystems.

However, a critical tension persists. Where Aday et al. and Kolade et al. are optimistic about African-led innovation, Moser et al. warn that externally imposed models may clash with local realities and derail sustainable outcomes. This tension highlights the need for further research on how African cities can balance global engagement with local empowerment, especially when foreign investments dominate infrastructure planning and design.

Despite the value of these contributions, a significant research void remains. Few studies link the dynamics of entrepreneurial ecosystems to the specific domain of green and digital urban mobility. Most existing work treats sustainability and entrepreneurship as disconnected themes. As a result, there is insufficient understanding of how African startups and SMEs utilize ecosystem supports such as funding, partnerships, and policy to design inclusive, climate-resilient mobility models.

This review addresses that gap by integrating insights across three research streams: green innovation, digital disruption, and entrepreneurship. It presents an interdisciplinary lens for understanding how urban mobility solutions emerge, evolve, and scale in African settings, particularly where resource scarcity and institutional fragmentation are most acute. In doing so, this study contributes to the development of a comprehensive, African-grounded framework for sustainable urban mobility entrepreneurship.

Research Gaps / Emerging Opportunities

The reviewed literature offers valuable insights into the role of green technologies, digital platforms, and entrepreneurial ecosystems in reshaping African urban mobility. However, several persistent research gaps and underexplored areas continue to limit a comprehensive understanding of innovation dynamics on the continent, as summarized in Table 1. While studies on green innovations (Jain et al., 2025; Longe, 2022; Bikam, 2021) identify key technologies and their environmental benefits, they predominantly emphasize technical performance metrics or national-level policy frameworks. This narrow focus tends to overlook how local entrepreneurs and SMEs adapt these green mobility solutions to the realities of informal transport systems, cost-sensitive markets, and infrastructural deficiencies across African cities.

Research on digital disruption (Hodson et al., 2024; Acheampong, 2022; Baudens et al., 2025) has highlighted the transformative influence of digital platforms in modernizing urban mobility systems. Yet, much of this scholarship is oriented toward consumer access, regulatory issues, and the operational logic of digital platforms, rather than the entrepreneurial pathways that drive technology diffusion and service innovation at the grassroots level. There is limited empirical evidence on how African SMEs are deploying technologies such as Mobility-as-a-Service (MaaS), e-logistics, or smart payment systems to build viable, inclusive, and scalable business models in fragmented, low-income urban markets.

The entrepreneurial ecosystem literature (Ade et al., 2023; Kolade et al., 2021; Moser et al., 2022) offers a robust discussion on institutional architectures, financing patterns, and geopolitical influences shaping entrepreneurship in Africa. However, this body of work largely treats sustainable urban mobility as a secondary concern, with limited integration of transport-focused innovation into mainstream ecosystem analysis. It remains unclear how local policy environments, access to capital, business incubation networks, and stakeholder coordination specifically support or hinder the growth of green and digital mobility ventures. This is especially true for small and medium-sized African cities, where institutional maturity, governance effectiveness, and infrastructure vary widely from those of major metropolitan centers.

Contemporary research remains largely concentrated on case studies from prominent urban hubs like Lagos, Nairobi, or Johannesburg. As a result, little is known about how innovation is unfolding in underrepresented geographies such as secondary cities, small towns, or peri-urban zones. Yet these areas often face different constraints and opportunities, including more agile governance structures, stronger community engagement, or different modes of informal transport integration. This presents an important research opportunity to examine spatial variation in innovation adoption and to identify place-based factors that either facilitate or impede mobility entrepreneurship in less-studied locales.

Bridging these gaps is essential to developing a more nuanced and context-aware understanding of Africa's urban innovation landscape. This study contributes by providing a comprehensive, Africa-focused synthesis that links entrepreneurial ecosystems, innovation trajectories, and urban mobility outcomes. It thereby supports both scholarly inquiry and policy development, offering tools to design interventions that are more responsive to local contexts and challenges. Ultimately, this review directly addresses the core objectives of the study by analyzing the types of mobility innovations emerging across the continent and the entrepreneurial and institutional factors that condition their effectiveness, scalability, and sustainability.

Table 1: Research Gaps Summary

Research Dimension	Previous Studies Focus	(Identified Gaps)
Green Mobility Innovations	Emphasis on technological performance, emissions reduction, ecological benefits, and national policy contexts (e.g., Jain et al., 2025; Longe, 2022).	Limited exploration of how local African SMEs and entrepreneurs adapt green mobility technologies to informal systems, affordability constraints, and infrastructure deficits.

Digital Disruption in Urban Mobility	Focus on user access, adoption barriers, governance models, and technical performance of platforms (e.g., Hodson et al., 2024; Acheampong, 2022).	Insufficient analysis of how digital tools (e.g., MaaS, e-logistics) are operationalized by SMEs to develop scalable, inclusive business models in fragmented urban markets.
Entrepreneurial Ecosystems	Discussion centers on financing, institutional frameworks, and geopolitical dynamics, often with limited sectoral specificity (e.g., Aday et al., 2023).	Sustainable urban mobility entrepreneurship is peripheral in most ecosystem literature; limited focus on transport-specific innovation support systems, especially in smaller cities.
Geographic Focus Studies	Predominantly concentrated on capital cities or major hubs like Lagos, Nairobi, and Johannesburg.	Insufficient research on secondary cities and peri-urban areas, where governance, infrastructure, and innovation capacity differ significantly.
Scaling Challenges	Acknowledges the need for scalable models and inclusive access but lacks in-depth studies on diffusion strategies and institutional barriers.	Need for deeper understanding of what enables or hinders inclusive scaling of mobility innovations across diverse African urban contexts. entrepreneurship within African contexts.

Table 1: This table lists the main thematic areas of focus, synthesizes the research gaps found in previous studies, and illustrates how the current study fills these gaps by incorporating knowledge about digital and green innovations, entrepreneurial ecosystems, and the results of urban mobility in various African contexts.

METHODOLOGY

This study utilized a systematic literature review method to consolidate existing research on green and digital innovations that propel urban mobility entrepreneurship in Africa. The review adhered to best-practice principles for systematic reviews, emphasizing transparency, replicability, and thematic rigor.

Research Design

The study employed a systematic review methodology to identify, select, and synthesize peer-reviewed literature published from 2012 to 2024. This design facilitated an in-depth analysis of the interplay between entrepreneurial ecosystems, innovation tactics, and government frameworks in shaping sustainable urban mobility outcomes in African cities.

Search Strategy and Databases

Relevant studies were located using systematic searches in prominent academic databases, such as Scopus, Web of Science, Google Scholar, and SpringerLink. The search utilized combinations of keywords including “green mobility,” “digital innovation,” “urban entrepreneurship,” “sustainable transport,” “Africa,” and “Mobility-as-a-Service (MaaS).” Boolean operators and truncation methods were employed to expand the search while maintaining topic relevance.

Inclusion and Exclusion Criteria

The composition of the Studies captured included if they (1) were peer-reviewed journal articles, book chapters, or high-impact conference papers; (2) concentrated on African urban contexts; (3) examined themes pertaining to green or digital mobility innovations, entrepreneurial ecosystems, or sustainability outcomes; and (4) were published in English from 2012 to 2024. Excluded were non-peer-reviewed materials, editorials, news items, and research lacking evident relation to urban mobility or entrepreneurship.

Data Extraction and Synthesis

Out of an initial pool of 92 identified studies, 68 met the established inclusion criteria and were selected for systematic review. These studies represented a diverse array of geographic settings across Africa, addressing a broad spectrum of innovation types and entrepreneurial strategies relevant to sustainable urban mobility. Data were extracted concerning each study’s objectives, geographic scope, types of innovations analyzed, entrepreneurial

mechanisms involved, and the specific challenges or enabling conditions reported. This structured extraction process ensured consistency across sources and allowed for meaningful cross-comparison of findings.

To analyze the collected data, a thematic synthesis approach was applied. This method organized the literature into three overarching themes: (1) green mobility innovations, (2) digital disruption in urban mobility, and (3) entrepreneurial ecosystems and SMEs. These categories were not only conceptually distinct but also mutually reinforcing, enabling a more integrated understanding of how innovations unfold in urban African contexts. This thematic organization helped identify key conceptual tensions in the literature, surface notable research gaps, and outline emerging areas of opportunity. The insights derived from this synthesis form the analytical foundation for the results and discussion presented in the subsequent sections.

To compliment thematic synthesis, a bibliometric co-occurrence network analysis was performed using VOSviewer to illustrate the conceptual connections among prominent keywords in the evaluated literature. This quantitative mapping enhanced the qualitative synthesis by elucidating grouped research themes, emerging focal areas, and interrelations among sustainability, entrepreneurship, and mobility innovation.

Limitations

This thorough evaluation of secondary sources is constrained by the breadth and quality of the existing literature. The research is limited by publication biases, geographic imbalances (predominantly centered on major urban areas), and the omission of gray literature or local case reports, despite attempts to achieve full coverage.

RESULTS

The systematic assessment of 68 eligible studies identified many repeating patterns and thematic insights about the influence of green and digital innovations on urban mobility entrepreneurship in African cities.

Green Mobility Innovations

The synthesis of analyzed studies indicates that green technologies including electric vehicles, solar-powered buses, non-motorized transport systems, and alternative fuels are increasingly recognized as pivotal tools in advancing urban sustainability agendas across Africa. Numerous studies (e.g., Jain et al., 2025; Longe, 2022; Bikam, 2021) have highlighted the capacity of these innovations to reduce greenhouse gas emissions, improve urban air quality, and lower long-term operating costs associated with traditional fossil-fuel transportation modes. These environmental and economic benefits reinforce the relevance of green mobility in supporting broader climate adaptation and sustainable development goals.

However, the implementation of green transportation solutions across African cities remains uneven and inconsistent. This inconsistency is primarily driven by a range of interrelated challenges, including high upfront capital requirements, limited availability of public or private financing mechanisms, and the lack of widespread charging or refueling infrastructure. In addition, many cities face weak regulatory enforcement, fragmented policies, and limited institutional coordination, all of which undermine the effective scaling of green transport interventions.

While a few leading urban centers have successfully piloted or deployed green transport initiatives, such as electric bus fleets or cycling infrastructure, the diffusion of these innovations into smaller cities and peri-urban areas remains minimal. These areas are often constrained by lower revenue bases, less technical capacity, and weaker planning frameworks. As a result, they are frequently excluded from national green transport strategies, further deepening spatial inequalities in access to sustainable mobility solutions. This uneven adoption underscores the urgent need for inclusive policy frameworks, targeted investment, and technical support mechanisms to extend the benefits of green mobility to underrepresented urban spaces.

Digital Disruption in Urban Mobility

The review noted an increasing scholarly focus on developments in digital mobility, including ride-hailing applications, Mobility-as-a-Service (MaaS) platforms, e-logistics services, and digital payment systems. Research (e.g., Hodson et al., 2024; Acheampong, 2022) emphasized the transformational impact of these technologies on mobility experiences, highlighting improvements in accessibility and the creation of new opportunities for service integration. These digital tools are reshaping how urban populations interact with transport systems by offering greater flexibility, responsiveness, and user-centered solutions.

Nonetheless, several persistent challenges hinder widespread adoption. These include a pronounced digital divide, inadequate regulatory frameworks, cybersecurity concerns, and a general lack of trust between users and service providers. Significantly, although digital mobility tools present strong entrepreneurial potential, there is limited research on how local SMEs are leveraging them to build inclusive and scalable business models particularly in

secondary cities and peri-urban settings. This gap points to the need for further investigation into how digital innovations can be localized and expanded beyond major urban hubs.

Entrepreneurial Ecosystems and SMEs

The examined literature progressively acknowledges the essential function of entrepreneurial ecosystems, encompassing finance methods, incubators, regulatory incentives, and public-private partnerships, in facilitating or hindering sustainable urban mobility entrepreneurship. Research (e.g., Aday et al., 2023; Kolade et al., 2021; Moser et al., 2022) indicates conflicts between local entrepreneurial efforts and the impact of foreign investments or government-led mega-projects, prompting inquiries on their congruence with local requirements and enduring viability. The findings indicate that although certain African metropolitan centers exhibit vitality and innovation, other smaller cities lack the necessary institutional depth, risk capital, and ecosystem coordination to facilitate the establishment and expansion of green and digital mobility enterprises.

The review emphasizes that although green and digital innovations possess transformative potential for enhancing sustainable and inclusive urban mobility, their efficacy is significantly contingent upon context-specific entrepreneurial capabilities, supportive governance structures, and inclusive innovation ecosystems. These findings establish the foundation for the subsequent debate, which examines significant paradoxes, scaling issues, and practical implications for policy, entrepreneurship, and urban development within African contexts.

To supplement the thematic synthesis, a keyword co-occurrence network analysis was performed with VOSviewer to depict the prevalent conceptual linkages in the studied literature (Figure 1). The network displays multiple dense clusters focused on phrases like “sustainable mobility,” “smart mobility,” “urban transportation,” and “sustainability,” signifying robust thematic interrelations among green innovation, digital disruption, and sustainable urban development. Terms such as “mobility solutions,” “climate change,” and “development process” serve as pivotal connections among clusters, illustrating the interconnectedness of technological, environmental, and entrepreneurial dialogues within the African urban mobility framework. The visualization also highlights less prominent but emerging terms, such as “autonomous vehicles” and “catalyst,” signaling future-oriented research areas gaining traction. Overall, the co-occurrence analysis reinforces the literature synthesis by illustrating how research themes coalesce around sustainability, innovation, and entrepreneurship within African urban transport systems.

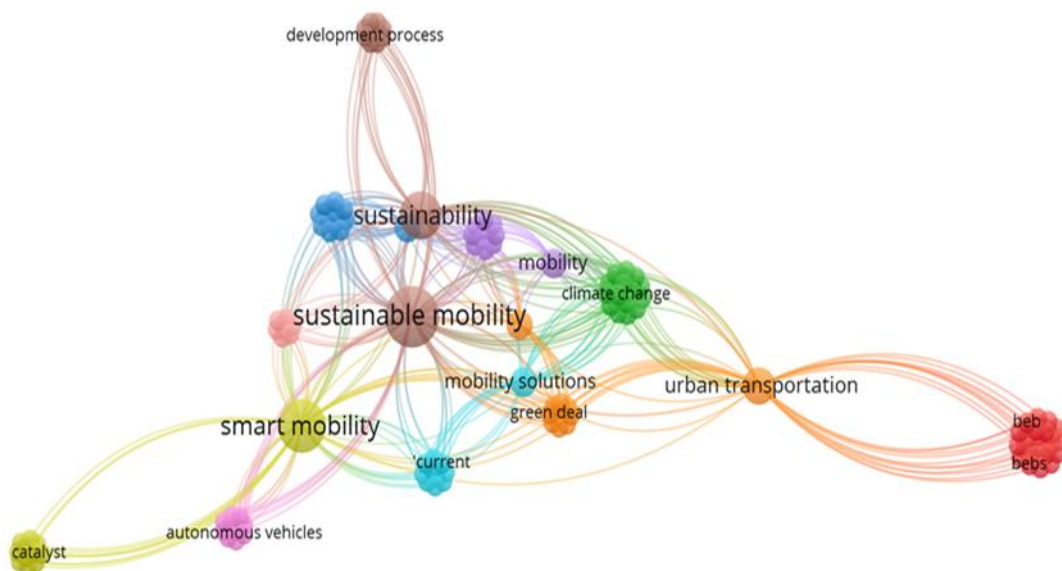


Figure 1. Keyword Co-occurrence Network of Literature on Green and Digital Urban Mobility in Africa.

Source: Generated using VOSviewer based on co-occurrence analysis of keywords from 68 peer-reviewed studies (2012–2024). Node sizes represent keyword frequency, while connecting lines indicate co-occurrence strength. Thematic clusters are color-coded and reflect key domains such as “sustainable mobility,” “urban innovation,” “digital platforms,” and “entrepreneurship.” Emerging terms like “autonomous vehicles” and “smart infrastructure” suggest future research directions

DISCUSSION

The results of this systematic review offer critical insights into how green and digital innovations intersect with entrepreneurial ecosystems to shape the future of sustainable urban mobility in African cities. Anchored in the study's guiding questions, the discussion synthesizes key thematic findings, aligns them with existing literature and theory, and highlights important contributions to knowledge, practice, and policy.

The analysis confirms that previous studies have identified the promise of green technologies and digital platforms in transforming urban transport (Jain et al., 2025; Hodson et al., 2024). However, much of this research has remained focused either on environmental outcomes or on user-level adoption, without adequately exploring the entrepreneurial and institutional systems that support implementation and scaling. This review extends that body of knowledge by emphasizing that the success of mobility innovations in African settings depends not just on technological solutions but also on the capacity of local ecosystems to support innovation.

One of the major contributions of this study is its integration of siloed academic conversations linking technology diffusion, entrepreneurship, governance, and sustainability into a cohesive analytical framework. This integrative approach offers a more complete understanding of how innovations move from idea to impact, especially in fragmented and resource-constrained environments. It also highlights the pivotal role of SMEs in responding to context-specific mobility challenges, where larger providers often lack agility or localized knowledge.

In doing so, the study challenges dominant narratives in existing literature that tend to focus on large, well-resourced cities like Lagos, Nairobi, or Johannesburg. By drawing attention to the relative neglect of secondary cities and peri-urban zones, the review brings to light the spatial inequality in innovation readiness, investment flows, and ecosystem support. This builds on earlier ecosystem-based studies (Aday et al., 2023; Kolade et al., 2021) by illustrating that while entrepreneurial energy exists across the continent, the enabling conditions required for success remain unequally distributed.

Additionally, the review highlights a significant tension within the innovation landscape between foreign-led urban mega-projects and locally grounded entrepreneurial activity. As noted by Moser et al. (2022), external actors often promote top-down urban solutions that may conflict with local needs and realities, raising concerns about the sustainability and appropriateness of such interventions. In contrast, local entrepreneurs are often better positioned to design context-sensitive innovations, but they face institutional and financial barriers that limit their reach.

From a theoretical standpoint, this study contributes to the resource-based view and entrepreneurial ecosystem frameworks by applying them to African urban contexts. It shows that competitive advantage in green and digital mobility arises not only from access to technology but from the orchestration of complementary capabilities such as governance support, financing mechanisms, digital infrastructure, and localized adaptation. This finding aligns with prior work by Barney (1991) and Teece (2007), while extending their relevance to cities operating under institutional fragility and infrastructural deficits.

Practically, the study points to several actionable insights. Policymakers should prioritize building stronger ecosystems through regulatory coherence, capacity-building for SMEs, and investment in supportive infrastructure. Donors and development agencies should shift from technology-centered funding to more holistic support that includes training, coordination platforms, and knowledge sharing across cities. Entrepreneurs, meanwhile, can strengthen their strategies by forging cross-sector collaborations and tailoring solutions to local mobility patterns and user needs.

Crucially, the review underscores that innovation must be not only sustainable and efficient but also inclusive and equitable. As such, future urban mobility strategies should explicitly address spatial and social inequalities, ensuring that marginalized regions and populations are not excluded from innovation benefits.

In sum, this study deepens understanding of how digital and green mobility technologies are being adapted, resisted, or scaled across African cities. It illuminates the systemic factors both enabling and obstructive that determine whether these innovations lead to meaningful transformation. These insights lay a strong foundation for further research, evidence-based policy design, and practice-oriented action aimed at achieving sustainable, inclusive urban mobility in Africa.

CONCLUSION AND RECOMMENDATIONS

This study provides a comprehensive and systematic synthesis of how green and digital innovations, entrepreneurial ecosystems, and governance structures interact to shape sustainable urban mobility entrepreneurship across African cities. Drawing on the analysis of 68 peer-reviewed studies, the paper makes three interconnected contributions.

It extends existing knowledge by integrating innovation and entrepreneurship research, showing that the success of sustainable urban mobility solutions in Africa depends not only on technological breakthroughs but also on the local capacities, institutional arrangements, and policy frameworks that support entrepreneurial action. The analysis also challenges the prevailing focus on large metropolitan centers by foregrounding the untapped potential and unique constraints of secondary cities and peri-urban areas, illuminating geographic inequalities in innovation

diffusion and scaling. In addition, the study contributes new theoretical insights by applying ecosystem and resource-based perspectives to African urban contexts, demonstrating how sustainable competitive advantage emerges from the orchestration of complementary capabilities under conditions of institutional and resource constraints.

From a practical and policy standpoint, the findings emphasize the importance of strengthening cross-sectoral partnerships, improving access to finance and digital infrastructure, and designing regulatory frameworks that are responsive to local entrepreneurial needs. Development actors and urban planners are encouraged to prioritize capacity-building initiatives that empower local SMEs and foster inclusive, context-specific mobility solutions. Building on these contributions, this study proposes a targeted future research agenda to advance the field beyond descriptive case studies or isolated analyses. Specifically, future research should address:

1. How do entrepreneurial ecosystems in secondary African cities differ structurally and functionally from those in large urban hubs, and what context-specific strategies are needed to support innovation diffusion in these settings?
2. Which African cities are emerging as leaders in green and digital mobility innovation, and what can be learned from their approaches? Cities such as Kigali (Rwanda), Cape Town (South Africa), and Addis Ababa (Ethiopia) have demonstrated progressive models in electric public transit, integrated digital platforms, and climate-resilient mobility systems. Future research could explore how these cities overcame systemic barriers and what constitutes transferable best practices that could guide innovation in other African urban settings.
3. What governance models best facilitate multi-stakeholder collaboration between public authorities, local entrepreneurs, and international actors to scale sustainable urban mobility solutions?
4. How can mixed-methods research designs integrating bibliometric mapping, network analysis, and qualitative stakeholder interviews be used to uncover the relational dynamics and power asymmetries that shape innovation pathways in African urban transport systems?

Answering these questions will provide deeper, more actionable insights into the enabling conditions, constraints, and opportunities for scaling sustainable, inclusive urban mobility innovations across diverse African contexts. By combining empirical research with methodological innovation, future studies can help unlock Africa's urban entrepreneurial potential to meet pressing challenges related to climate resilience, social equity, and mobility transformation.

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INTRODUCTION OF FINANCIAL TRANSACTION TAX IN THE SLOVAK REPUBLIC

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Abstract:

The transaction tax was introduced in Slovakia in January 2025. The tax will be levied on payments originating from the bank accounts of individuals (entrepreneurs) and legal entities, with several exceptions. It will apply to bank transfers, such as invoice payments, net salary payments, loan or leasing installments, cash withdrawals, and the use of payment cards. In most cases, the transaction tax is not paid by the entrepreneurs themselves, but by domestic payment service providers, primarily banks. The tax will apply to a financial transaction in which an amount of funds is debited from the taxpayer's payment account, the use of an active payment card issued to the transaction account for the purpose of carrying out a financial transaction, and the recalculated cost related to the execution of a financial transaction that relates to the taxpayer's activities carried out in the country. The aim of the paper will be to analyze the impacts of transaction tax on the business environment in Slovakia.

Keywords: Financial transaction tax, European Union, Slovakia

INTRODUCTION

The purpose of a Financial Transaction Tax (FTT) is to achieve several key economic and social objectives. One of its primary purposes is to raise public revenue. Financial markets handle enormous volumes of trades every day, and by applying even a very small tax on each transaction, governments can generate significant income. This revenue can be used to fund public services, reduce national deficits, or support global priorities such as climate change mitigation or international development.

Another major purpose of the FTT is to curb excessive speculation, especially high-frequency or short-term trading that can contribute to financial market instability. By imposing a small cost on every transaction, the FTT discourages rapid, repetitive trades that often have little to do with the real economy. In this way, the tax is intended to encourage more stable, long-term investment strategies and reduce the likelihood of events like flash crashes or speculative bubbles.

The FTT is also designed to promote fairness in the tax system. The financial sector is often seen as under-taxed compared to other industries, despite its central role in the economy and its reliance on public support during financial crises. By introducing a transaction tax, governments can ensure that financial institutions contribute a fairer share to public finances.

In addition, the FTT aims to correct market externalities. Financial activity can generate risks that affect the wider economy, such as systemic instability or economic downturns triggered by reckless trading. These negative effects are not usually reflected in the cost of doing business in financial markets. The FTT acts as a Pigovian tax, meaning it helps internalize these external costs by making traders bear some of the broader social risks they create.

Overall, the Financial Transaction Tax is intended to serve as both a revenue-generating tool and a regulatory measure, promoting more stable, fair, and responsible financial markets.

THEORETICAL BASIS OF FINANCIAL TRANSACTION TAX

The theory of a Financial Transaction Tax is rooted in several economic and social objectives. At its core, an FTT is a small tax levied on the trade of financial instruments such as stocks, bonds, derivatives, or currencies. The idea behind this tax is to influence financial market behavior, raise public revenues, and promote greater economic fairness.

One of the central theoretical justifications for a financial transaction tax is its potential to curb excessive short-term speculation in financial markets. Financial markets, particularly with the rise of high-frequency trading, can experience extreme short-term volatility that often bears little connection to underlying economic fundamentals. By introducing even a very small cost to each transaction, an FTT is thought to discourage high-frequency speculative trading while having a minimal impact on longer-term investors who trade less frequently. In this way, the tax is intended to enhance financial stability and reduce the risk of bubbles or flash crashes that could lead to broader economic disruptions.

In addition to its stabilizing effect, the FTT is proposed as a tool for revenue generation. Because financial markets involve an enormous volume of transactions daily, even a tiny levy could yield significant public income. This revenue could be used for a range of social and developmental goals, such as funding public services, reducing deficits, or addressing global challenges like climate change. Advocates also see it as a way to ensure that the

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financial sector—which played a significant role in the 2008 global financial crisis—contributes its fair share to society, particularly since it often benefits from public bailouts during crises.

Another theoretical argument in favor of the FTT relates to externalities in the financial system. When market participants engage in risky or speculative behavior, the consequences can spill over to the broader economy. These negative externalities are not reflected in the prices of financial transactions, leading to excessive risk-taking. An FTT, therefore, acts as a Pigovian tax, helping to internalize these external costs and align individual incentives with broader social welfare.

Equity is another foundational principle in the theory of financial transaction taxation. Supporters argue that the financial sector is under-taxed relative to its size and influence in the economy. Since financial wealth and trading activity are concentrated among the wealthiest individuals and institutions, an FTT would predominantly affect those with greater ability to pay. As such, it is viewed as a progressive tax measure that can help address growing income and wealth inequality.

Despite these theoretical benefits, the FTT is not without criticism. Economists and financial practitioners often argue that such a tax could reduce market liquidity, making it more expensive and difficult for investors to buy or sell assets. This could lead to less efficient price discovery and higher trading costs, especially for large institutional investors like pension funds, which might pass these costs on to savers. Critics also warn that the incidence of the tax—who ultimately bears the cost—might not fall on speculators alone but could be shifted to consumers and smaller investors.

Another challenge arises from the global nature of financial markets. If only a few countries implement the tax, trading might shift to jurisdictions where it is not applied, undermining its effectiveness and reducing expected revenues. This is why many economists argue that international coordination is essential for an FTT to work as intended.

Finally, some economists question the reliability of FTT revenue over time. Because financial markets are cyclical and transaction volumes can fluctuate widely, the income generated from the tax might be volatile and difficult to predict, making it less suitable as a long-term revenue source.

In summary, the theory behind a financial transaction tax is built on the goals of reducing harmful speculation, generating public revenue, correcting market failures, and promoting economic fairness. While it offers appealing advantages in theory, the practical challenges of implementation, enforcement, and global coordination remain subjects of ongoing debate among economists and policymakers.

IMPLEMENTATION OF FTT ACROSS COUNTRIES

In practice, the FTT has been implemented in various forms across different countries, with mixed outcomes. While the theoretical motivations—reducing market volatility, raising public revenue, and promoting fairness—remain central, the real-world experience highlights a number of practical challenges and insights.

Several countries have enacted versions of an FTT, most often targeting equity transactions, but sometimes extending to bonds and derivatives. The design and outcomes of these taxes vary significantly.

France introduced a financial transaction tax in 2012, followed by Italy in 2013. Both taxes apply primarily to equity transactions involving large publicly listed companies, as well as certain derivatives and high-frequency trades. In France, the tax rate was initially set at 0.2% (later increased slightly), and it applied to purchases of shares in French companies with a market capitalization above a certain threshold. Italy's version was more complex, involving taxes on equity trades, derivatives, and high-frequency trading strategies. In both cases, the FTT raised significant revenue, though less than initially projected. There was evidence that trading volumes declined slightly, particularly in affected instruments. However, fears of major liquidity disruptions did not fully materialize. Still, some market participants shifted their trading to untaxed financial instruments or to other jurisdictions, reflecting concerns about evasion and market migration.

The UK has long had a Stamp Duty Reserve Tax, a form of FTT that applies to the purchase of UK equities. It is typically set at 0.5% and is charged on transactions involving shares of UK-incorporated companies. This tax has generated stable revenue over time and is generally considered successful in terms of administration. However, its narrow scope—excluding derivatives, bonds, and foreign equities—limits its broader economic impact. Notably, high-frequency trading and many institutional investors avoid the tax through various exemptions or by trading in untaxed instruments.

Sweden's experience in the 1980s is often cited as a cautionary tale. The country introduced a tax on equity transactions in 1984, followed later by taxes on bonds and derivatives. Initially, the tax rates were relatively low, but they were increased over time. The result was a sharp decline in trading volume. Many investors simply moved their trading activities to London and other financial centers, avoiding the Swedish tax. As a result, the expected revenues never materialized, and the government repealed the tax entirely by 1991. This experience is frequently referenced by critics of the FTT as evidence of the difficulty in enforcing such a tax without international coordination.

In several Asian countries, variations of transaction taxes exist. For example, Hong Kong and India impose stamp duties or securities transaction taxes on certain trades. These taxes have generally been modest in scope and have not deterred trading significantly, partly because they are long-standing and well-integrated into the market structures.

FINANCIAL TRANSACTION TAX IN EU

The European Union has debated a region-wide FTT for more than a decade, spearheaded by countries like France and Germany. The goal was to implement a harmonized tax to avoid market fragmentation and capital flight. The initial proposal included a 0.1% tax on equity and bond transactions, and a 0.01% tax on derivatives. However, political disagreements over scope, rate, and revenue sharing have stalled progress. As of now, only a few EU countries have moved forward with partial national implementations, while a comprehensive EU-wide FTT remains elusive.

In practice, the financial transaction tax has yielded mixed results:

- *Revenue Generation:* It can raise significant funds, but often less than projected, especially if traders adjust behavior or shift to untaxed products.
- *Market Impact:* While liquidity may be reduced in the short term, the long-term impact varies by market structure and tax design. Carefully designed taxes, such as the UK's stamp duty, seem to coexist with healthy markets.
- *Behavioral Changes:* Traders adapt to avoid the tax—by trading less, shifting to derivatives, or moving operations abroad—highlighting the importance of tax scope and enforcement.
- *Administrative Feasibility:* Simpler taxes (e.g., on equities only) are easier to administer and enforce. More complex FTTs that cover a wide range of instruments and participants may face technical and compliance challenges.
- *Administrative Feasibility:* Simpler taxes (e.g., on equities only) are easier to administer and enforce. More complex FTTs that cover a wide range of instruments and participants may face technical and compliance challenges.

In real-world practice, the financial transaction tax has been used in various national contexts, with differing levels of success. Its effectiveness depends heavily on tax design, enforcement mechanisms, market structure, and international coordination. While it can serve as a valuable tool for revenue generation and potentially reduce speculative trading, the risk of unintended consequences - such as reduced market liquidity and capital flight—requires careful consideration and design.

The Financial Transaction Tax in the European Union has been the subject of extensive debate and negotiation for over a decade, reflecting both the promise and the challenges of implementing such a measure across a diverse and integrated economic region.

The idea of an EU-wide Financial Transaction Tax gained momentum after the 2008 global financial crisis. Policymakers were motivated by several goals:

1. Curbing excessive speculation and high-frequency trading, which many believed contributed to financial instability.
2. Ensuring that the financial sector, which had benefited from large public bailouts, contributed fairly to public finances.
3. Raising revenue to help support national budgets and, potentially, fund EU-level priorities such as climate action or development aid.

However, the proposal faced strong opposition from several member states, including the UK, Ireland, and Luxembourg, who argued it would hurt their financial sectors, lead to capital flight, and be difficult to enforce.

Due to the lack of unanimous agreement, 11 EU member states opted to pursue the FTT under the "enhanced cooperation" mechanism, which allows a group of at least nine EU countries to move forward with legislation even without the support of all member states.

Table 1: Participating countries on FTT in EU

EU	France	Germany	Italy
Spain	Belgium	Austria	Portugal
Greece	Slovakia	Slovenia	Estonia*

Source: own processing

While EU-wide or enhanced cooperation implementation has stalled, France and Italy introduced their own national versions of an FTT. France (since 2012): Applies a 0.3% tax on share purchases of large French companies and a smaller tax on high-frequency trading and credit default swaps. Italy (since 2013): Taxes equity trades of Italian-listed companies, certain derivatives, and high-frequency trades. These national efforts reflect a compromise: acting locally while waiting for a broader EU solution.

As of 2025, the EU-wide FTT has still not been implemented. Germany and France—key supporters—have continued to push for a simplified version, possibly based on the French model, limited to shares of large companies. This would avoid the complexity of taxing a broader range of financial instruments. Negotiations have stalled multiple times due to:

- Divergent national interests
- Concerns over financial competitiveness
- Brexit (which removed the UK, a major opponent, but also reshaped EU market dynamics)

The EU has since shifted focus to other fiscal tools, such as the Digital Services Tax, the Carbon Border Adjustment Mechanism, and new budgetary instruments tied to the post-COVID recovery fund.

The Financial Transaction Tax in the EU remains an **unfinished project**. While its goals of curbing risky trading behavior and generating revenue remain attractive, political divisions, technical complexity, and fears of harming market competitiveness have delayed its full implementation. The most progress has occurred at the national level, especially in France and Italy. A true EU-wide FTT would likely require a simplified design, strong political will, and mechanisms to prevent capital flight and market distortion across borders.

CONSOLIDATION OF PUBLIC FINANCES IN THE SLOVAK REPUBLIC

Slovakia is currently undertaking a comprehensive fiscal consolidation effort aimed at reducing its public deficit and stabilizing government finances over the coming years. The government has set specific targets to lower the general government deficit from an estimated 5.8% of GDP in 2024 to 4.7% in 2025, with further reductions planned to reach 3.0% by 2027. To meet these goals, Slovakia plans to implement additional fiscal measures amounting to about 1.9% of GDP, which is roughly €2.8 billion.

Key measures in this consolidation plan include raising the standard value-added tax (VAT) rate from 20% to 23%, while maintaining reduced rates for certain essential goods such as food, electricity, textbooks, and medicines. Additionally, a new Financial Transaction Tax (FTT) will be introduced starting in April 2025, targeting various financial operations like bank transfers and card payments, and expected to generate around €600 million in revenue in its first year. Corporate tax rates will also increase for large companies with taxable income exceeding €5 million, rising from 21% to 24%. Furthermore, social contributions will be increased for high-income employees.

Despite these efforts, public debt in Slovakia is projected to rise moderately, from about 56.1% of GDP in 2023 to nearly 62% by 2026, partly due to continued budget deficits that are only partially offset by economic growth. The International Monetary Fund (IMF) has noted risks associated with this plan, cautioning that expected revenues may fall short and recommending that Slovakia also focus on better expenditure control, including reducing subsidies, improving the targeting of social benefits, and managing public sector wages.

The long-term goal is to reduce the deficit to 2% of GDP by 2028, requiring sustained fiscal discipline and the implementation of consolidation measures totaling approximately 4.4% of GDP, or about €7 billion, over the next four years. Overall, Slovakia's fiscal consolidation strategy combines tax increases and spending controls to restore budgetary balance, but its success depends heavily on effective execution and managing the economic challenges ahead.

TRANSACTION FINANCIAL TAX IN SLOVAKIA

Slovakia is set to introduce a new FTT starting April 1, 2025, as part of its fiscal consolidation efforts. This tax will primarily affect businesses and self-employed individuals, while private individuals will generally be exempt. Slovakia is introducing a Financial Transaction Tax beginning on April 1, 2025, as part of a broader fiscal consolidation package aimed at stabilizing public finances. The tax is primarily targeted at legal entities, entrepreneurs (self-employed individuals), and branches of foreign entities operating in Slovakia. Private individuals, in general, are not subject to the tax unless they engage in business activities.

Under the new FTT rules, certain financial transactions will be taxed at different rates. Outgoing payments from a transaction account will be taxed at 0.40%, with a maximum of €40 per transaction. Cash withdrawals from a transaction account will be taxed at 0.80%, and there will be no upper limit on the amount taxed. Additionally, there will be a fixed charge of €2 per year for the use of a payment card linked to a transaction account. For recharged financial expenses (i.e., expenses passed on to customers or clients), a 0.40% tax will apply with no cap. However, not all transactions will be taxed. Payments of taxes and social contributions, internal transfers between the taxpayer's own accounts within the same bank, securities trading conducted on behalf of clients, payments at post offices, and purchases of government bonds will be exempt.

Businesses and entrepreneurs must ensure they have a dedicated transaction account for their business activities by March 31, 2025. Transactions related to their business operations must go through this account. The tax will be withheld automatically by banks when payments are made from these accounts.

Using a foreign bank account does not exempt a taxpayer from the FTT. If Slovak entrepreneurs use accounts outside Slovakia, they will be responsible for calculating and reporting the tax themselves on a monthly basis, which could add administrative burden.

The first reporting period for the tax will cover April to June 2025, with the tax payment due by July 31, 2025.

This new tax is expected to increase costs for businesses, particularly those that conduct a high number of financial transactions. Companies may need to reevaluate their payment structures and transaction practices to minimize their exposure to the tax. Overall, the FTT represents a significant change to the Slovak tax landscape and may have broader implications for business operations, cash flow, and financial planning.

Table 2: Rates of FTT in Slovakia

Rate	Impact on:
0.40%	on outgoing payments from a transaction account, capped at €40 per transaction
0.80%	on cash withdrawals from a transaction account, with no maximum cap
0.40%	on recharged expenses related to financial transactions, with no maximum cap
€2	annually for the use of a payment card linked to a transaction account

Source: Deloitte, 2025

The primary objective of the FTT is to bolster public finances. The Slovak government expects the tax to contribute approximately €600 million to the state budget in 2025. This revenue is intended to support fiscal consolidation efforts and reduce the national deficit.

Table 3: Transactions exempt from the FTT

Type of transaction:	Description
Payments	of taxes and social security contributions
Transfers	between accounts held by the same taxpayer within the same bank
Payments	related to securities trading conducted by the trader on behalf of clients
Payments	at postal offices
Payments	for the purchase of government bonds

Source: Deloitte, 2025

The impact of financial transaction tax in Slovakia

Slovakia's introduction of a financial transaction tax (FTT) in 2025 has significantly impacted the business environment, with both positive and negative effects observed across various sectors.

Table 4: The negative impacts of financial transaction tax in Slovakia

Increased Operational Costs	Businesses have reported significant additional costs due to the FTT. For instance, a company transferring €10,000 would incur a €40 tax, whereas a cash withdrawal of the same amount would result in an €80 tax. These increased costs can strain company budgets, especially for small and medium-sized enterprises.
Reduced Competitiveness	The European Commission has expressed concerns that the FTT could harm Slovakia's competitiveness and investment climate. Multinational companies have indicated declining interest in expanding operations in Slovakia, with some shifting roles abroad due to rising operational costs.
Encouragement of Informal Economy	The FTT may incentivize businesses to revert to cash-based transactions to avoid the tax, potentially leading to a growth in the informal economy.
Administrative Burden	The implementation of the FTT has increased administrative duties for businesses and banks. Companies must maintain detailed records of transactions, and banks are responsible for collecting and remitting the tax, adding to their operational complexities.

Source: Own processing

Table 5: The positive impacts of financial transaction tax in Slovakia

Revenue Generation	The government anticipates that the FTT will raise approximately €700 million annually, contributing to fiscal consolidation efforts aimed at reducing public debt.
Promotion of Electronic Payments	By imposing higher taxes on cash withdrawals, the FTT encourages businesses and consumers to adopt electronic payment methods, potentially leading to greater financial transparency and efficiency.

Potential for Improved Financial Transparency	With more transactions occurring electronically due to the tax, financial monitoring and regulation become easier, aiding in reducing tax evasion and money laundering.
Aligns with EU-wide Discussions on Financial Transaction Taxes	Slovakia's FTT brings the country in line with broader European initiatives aiming to implement financial transaction taxes, promoting cooperation and harmonization within the EU financial markets.

Source: Own processing

CONCLUSION

The introduction of a Financial Transaction Tax (FTT) in Slovakia could have several economic and social implications. Most notably, it would affect the functioning of the financial market, investor behavior, and the overall business environment.

One of the main consequences would likely be a reduction in trading activity on capital markets. An FTT increases the cost of each financial operation, which may lead to a decline in transaction volumes, particularly in short-term and speculative trading. Financial institutions and investors might shift their activities to countries that have not implemented such a tax, potentially weakening the domestic stock exchange and reducing market liquidity.

On the other hand, an FTT could serve as a new source of revenue for the state budget. Proceeds from this tax could support fiscal consolidation, especially during periods of high public deficit. However, it is important to note that revenues from an FTT are often unpredictable and depend on market reactions, the scope of exemptions, and the degree of tax competition in the region.

From the perspective of investors and businesses, introducing an FTT would increase transaction costs, which could negatively affect investment returns. Smaller investors, pension funds, and insurance companies might be more significantly impacted than large multinational corporations, which are more flexible in relocating their operations.

Administratively, the implementation of an FTT would require a complex system for tax collection and oversight, including cooperation between financial institutions and tax authorities. Harmonization at the European Union level would be crucial. If Slovakia were to implement the tax unilaterally, without coordination with other countries, there would be a risk of capital flight and erosion of the tax base to jurisdictions with more favorable tax regimes.

A Financial Transaction Tax in Slovakia could provide additional tax revenue but may also negatively impact the financial sector, investor behavior, and the country's competitiveness. The success of such a measure would largely depend on its specific design and the extent of international coordination, especially within the European Union. While the financial transaction tax in Slovakia aims to bolster state revenue and promote electronic payments, its implementation has introduced significant challenges for businesses. The increased operational costs, potential reduction in competitiveness, and administrative burdens may outweigh the benefits unless accompanied by supportive measures for businesses. Ongoing evaluation and adjustments to the tax policy will be crucial to mitigate its negative impacts on the business environment.

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PATH TO COMPETITIVENESS WITHIN THE EU

Elena Fífeková¹ and Eduard Nežinský²

Abstract:

Enhancing competitiveness is one of the long-term strategic objectives of the European Union. The drive to improve competitiveness is motivated not only by the aim of ensuring sustainable prosperity across the Union, but also by the ambition to reduce the gap with the United States and China, and to strengthen the EU's geopolitical position. It is therefore essential that all EU Member States actively work to improve various dimensions of competitiveness. This paper focuses on assessing the competitive positioning of selected EU Member States, with particular emphasis on Slovakia and Croatia. The structural aspect of competitiveness is examined through a commodity-based and structural comparison of the nature of competitiveness, using the concept of export factor intensity as the main analytical lens.

Keywords: competitiveness, export structure, factor intensity

INTRODUCTION

Despite the fact that more than 30 years ago, the need to increase the EU's competitiveness was emphasized in the Delors White Paper, and subsequent strategies aimed at boosting competitiveness were adopted (The Lisbon Strategy 2000–2010, Europe 2020), the EU has not managed to eliminate its lag in competitiveness behind the USA and China. The basic framework for addressing this issue is outlined in the current strategy (The Draghi Report on EU Competitiveness, A Competitiveness Compass for the EU).

Following Draghi's strategy, the Competitiveness Compass was developed at the beginning of this year, aiming to restore the EU's dynamism and help increase its global competitiveness.

The current focus on increasing the competitiveness of the EU and its members is mainly driven by the changing economic reality, which is linked to escalating geopolitical tensions and uncertain economic growth. This makes it more difficult both to penetrate foreign markets and to cope with foreign competition in domestic markets. A decisive role in the competitiveness of countries is also played by the development of artificial intelligence and the ability to handle its associated challenges.

These factors influence the position of countries in the global competitiveness rankings. While the USA was the world leader in competitiveness up until 2015, China's position (23rd place) at that time indicated a considerable gap behind the most competitive countries. In recent years, however, China's position has improved (now 14th place), while the position of the USA has gradually worsened (now 12th place).

In the following, we will focus on assessing the three largest players shaping the development of competitiveness—namely, the USA, China, and the EU. Since the EU is a highly heterogeneous community in terms of competitiveness, we will evaluate the position of only selected successful and less successful countries, with a more detailed examination of Croatia and Slovakia.

METHODOLOGY AND DATA

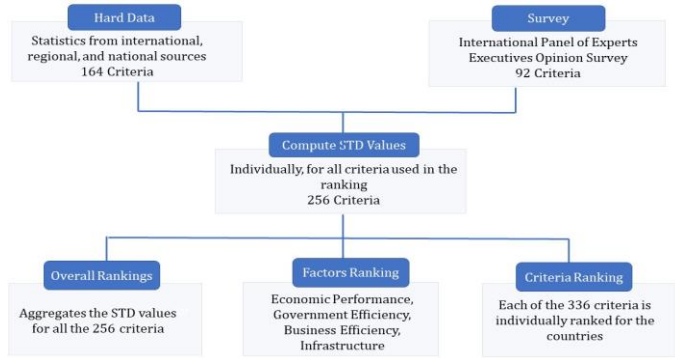
Competitiveness

We will examine the competitiveness of countries based on the approach of the International Institute for Management Development (IMD), which has been assessing the creation of conditions for its growth in more than sixty countries worldwide since the late 1980s. The IMD consistently evaluates the formation of conditions for increasing competitiveness, economic level, and the well-being of the population over the long term.

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Figure 1 IMD World competitiveness assessment scheme



Source: IMD, 2024.

It compiles the World Competitiveness Index (WCI), which, through various indicators, assesses the quality of the domestic environment in individual economies and the ability of macroeconomic and business environments to support both domestic and international competitive positions. The total weight of individual subfactors for the most competitive country reaches 100%.

The 2024 IMD World Competitiveness Ranking (WCR) has been built in the context of several ongoing global issues that present challenges to the competitiveness of the economies we assess. For instance, the constant tensions between the US and China and the resulting trade disruptions. Another example of such challenges is the continuous armed conflicts that compound existing economic trends such as inflation and poverty. Geopolitical tensions also exacerbate supply-chain disruptions affecting global production (IMD, 2024).

Another perspective on competitiveness focuses on realized competitiveness, as reflected in the *factor intensity* of a country’s exports. This approach examines the composition of the export basket, analysing the extent to which exported products rely on raw materials, labour, capital, or science and research. When it comes to the science and research intensity of exported goods, special attention is paid to whether the underlying research is easily imitable or represents difficult-to-replicate innovation.

RESULTS

Worldwide competitiveness – rising China

As mentioned in the introduction, a key trend in global competitiveness over the past quarter-century has been the steady decline of the United States from its position as the leading competitive economy to its current twelfth-place ranking. In contrast, China has made notable progress, climbing from 31st to 14th place during the same period. According to the World Competitiveness Ranking, Singapore currently holds the top position (100%), followed by Denmark, Switzerland, the Netherlands, and Hong Kong.

Figure 2 World Competitiveness Ranking top 20 counties (2024, %)

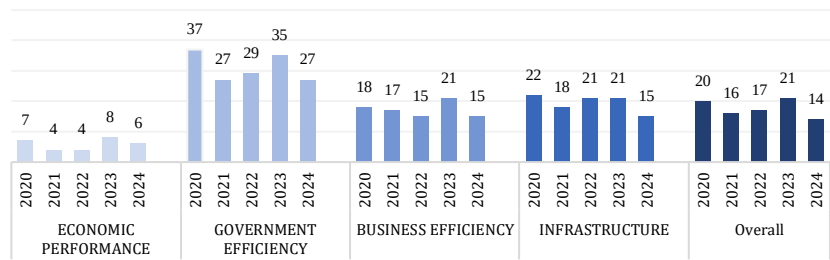


Note: 2020 ranking in brackets

Source: IMD, 2024.

China’s improved position in the global competitiveness ranking can primarily be attributed to its progress in government efficiency and infrastructure (Figure 3). A closer look at the quality of these sub-factors reveals enhancements in the business environment, particularly in areas such as legislation, the institutional framework, and scientific and technological infrastructure.

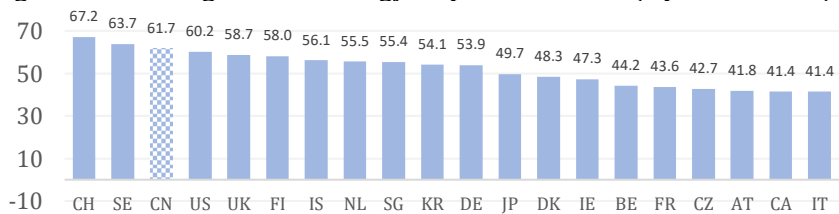
Figure 3 China’s Position across WCI Sub-Factors



Note:2020 ranking in brackets
Source: IMD, 2024.

It should be emphasized that China owes its current level of competitiveness in part to a significant advancement in innovation. In particular, the country has risen to third place in the area of knowledge and technology outputs within the Global Innovation Index (GII). This index assesses the innovation performance and highlights the latest global innovation trends across 137 countries (since 2007, the Global Innovation Index has been compiled by the World Intellectual Property Organization (WIPO)).

Figure 4 Knowledge and technology outputs within GII (top 20 countries)



Source: WIPO, 2024.

Although China still lags significantly behind the most advanced countries in terms of the structural conditions for enhancing competitiveness, its notable improvement in government efficiency suggests that the country is undertaking important systemic reforms. These reforms are expected to improve the business environment and enhance the nation's overall competitiveness.

China’s growing global role is also evident in its increasing share of global GDP. At the beginning of the millennium, China accounted for just under 3.6% of global GDP (compared to over 30% for the United States and more than 20% for the European Union). According to the latest IMF data (International Monetary Fund, World Economic Outlook Database, April 2025.), China’s share has risen to nearly 17%, while the U.S. share has declined to just under 27%, and the EU to 17.6%. In addition, since 2000, China’s share of global exports has increased by nearly 10 percentage points (UNCTAD, 2025), marking a significant expansion in its role in international trade. A major driver of China’s long-term advancement has been its relentless pursuit of global economic and military dominance. The country has ramped up spending on space exploration, with the goal of space access and presence, and continues to increase its military expenditures, establishing itself as a nuclear power. It is building up its naval forces to secure dominance over global maritime trade routes. Moreover, China has emerged as a technological and digital powerhouse, with ambitions to become a global leader in science and innovation.

Despite recent concerning downward trends, China remains an attractive destination for foreign investors. Structural challenges such as corruption, frequent legal changes, and weak rule of law persist, but these are largely offset by the country's large domestic market and cost-related competitive advantages. Alongside its export-led growth strategy, China is increasingly focusing on outbound foreign investment, whose share of global stock has grown more than 17.6 times over the past 25 years. These investments are concentrated primarily in less-developed countries, particularly in Africa, and are driven by strategic interests in securing control over global raw material supplies. From a competitiveness standpoint, it is also significant that China’s domestic savings exceed domestic investment, resulting in a high current account surplus, which strengthens the country’s macroeconomic stability and international financial position.

Competitiveness of the EU

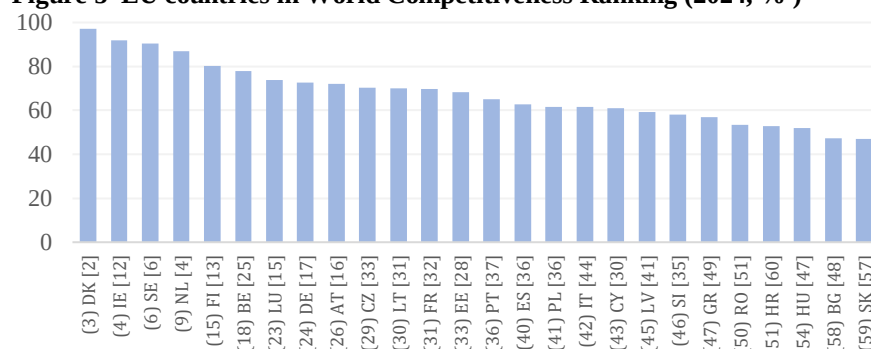
The competitiveness of the European Union (EU) can only be evaluated through the performance of its individual member states in international rankings. A fundamental challenge facing EU competitiveness is its fragmentation in comparison to global economic powers. The integration process has so far failed to eliminate the structural

diversity among member economies, and it is often marked by partial national interests and differing views on the depth, pace, and nature of integration. Some measures appear to be driven more by political ambition to accelerate integration than by underlying economic realities.

In practice, support for EU competitiveness has largely remained declarative, focused on the adoption of strategies and action plans. However, the actual implementation of these measures in the economic policies of individual member states has often been vague and secondary to more pressing national priorities, such as efforts to address fiscal imbalances. A pronounced disparity continues to exist between the so-called “old” and “new” EU member states, both in terms of capacity and competitiveness outcomes.

Among EU countries, Denmark currently holds the highest position in the World Competitiveness Ranking, placing third (Figure 5). However, it has lost its leading position over the past two years. This modest decline reflects weakening economic performance, high tax burdens, and slow progress in structural reforms—particularly in areas such as labour market flexibility, productivity growth, investment in the ICT sector, digitalisation of the public sector, and support for research and innovation. Denmark ranks 10th in the Global Innovation Index (GII). Ireland has shown the most significant improvement among EU member states over the past five years, moving from 12th to 4th place in the World Competitiveness Ranking. However, it experienced a two-place decline year-on-year. This drop was driven by a fall in economic performance, reduced government efficiency, lower gross fixed capital formation, declining outbound investment, and the relocation of some businesses abroad. Nevertheless, Ireland continues to benefit from well-developed infrastructure and strong business efficiency, which support the competitiveness of its enterprises.

Figure 5 EU countries in World Competitiveness Ranking (2024, %)



Note: (2020) and [2024] rankings

Source: IMD, 2024.

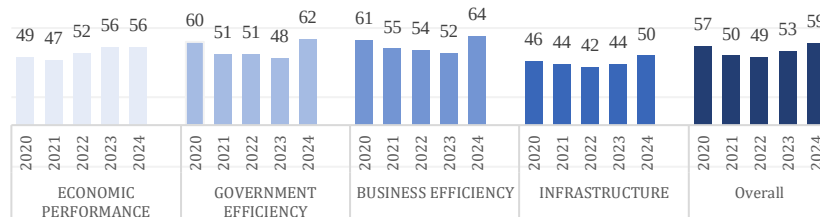
A warning signal for the European Union is the fact that only four EU countries ranked among the top ten most competitive economies—namely Denmark, Ireland, Sweden, and the Netherlands. Within the top 20, Finland maintained its position, and Belgium improved significantly, rising from 25th place in 2020 to 18th in the current ranking. In contrast, Luxembourg, Germany, and Austria dropped out of the top 20, with Austria falling from 18th place in 2020 to 26th place. In the latest assessment, none of the new EU member states succeeded in entering the top 20. Among this group, the Czech Republic (29th place) and Latvia (30th place) achieved the highest positions in the World Competitiveness Ranking.

At the lower end of the competitiveness spectrum, several so-called new member states – including Slovakia, Bulgaria, Hungary, Croatia, and Romania—continue to lag behind. Despite having adopted strategies aimed at enhancing competitiveness, implemented national reform programs, and identified key challenges focused on improving the business environment and strengthening knowledge-intensive sectors (such as science, research, development, and education), these countries have not managed to converge with the most competitive EU economies. In some cases, their positions have even deteriorated.

Slovakia vs Croatia

As shown in Figure 5, Slovakia is currently the least competitive EU country, with its position deteriorating in recent years. While Slovakia ranked 49th in 2022, it has now fallen to 59th place out of the 67 countries assessed. This represents the most significant decline in its competitiveness ranking over the past five years, with the sharpest drop occurring in the most recent period.

Figure 6 Slovakia - subdimensions of WCR index



Source: IMD, 2024.

The recent decline in Slovakia's competitiveness ranking is primarily attributable to two sub-indices: business efficiency and government efficiency. As shown in Table 2, the most critical factor weakening Slovakia's position in government efficiency is the state of public finances—characterized by a rising public debt and growing uncertainty surrounding fiscal consolidation. Business legislation also contributes negatively, particularly due to the lack of transparency in public procurement and the complexity of tendering procedures. Within the domain of business efficiency, Slovakia's competitiveness is most hindered by labour market regulation, which remains overly restrictive and imposes a significant burden on employers. Among the subfactors of the World Competitiveness Index (WCI), the lowest ranking is recorded in the "attitudes and values" component. This reflects challenges in areas such as country branding, entrepreneurial image, flexibility and adaptability in facing new challenges, the need for economic and social reforms, and the level of digital transformation.

Slovakia's current unfavourable standing in the WCI highlights a long-standing neglect of qualitative aspects of economic development, which are essential for both macroeconomic stability and a conducive business environment. This underperformance is mirrored in the insufficient support for, and implementation of, proclaimed economic policy goals aimed at enhancing the quality of research and development, education, innovation performance, and digital advancement. Although the level of tertiary education is gradually improving, the education system still fails to supply a workforce that adequately matches the economy's qualification needs.

A major structural challenge remains the outflow of skilled labour abroad. This persistent brain drain, combined with domestic skills gaps, leads to labour shortages across key sectors. In conclusion, Slovakia has room for improvement across all subfactors of competitiveness. Enhancing its competitive position is closely tied to strengthening the qualitative drivers of growth—namely, by fostering higher productivity, innovation capacity, and the quality of research and education.

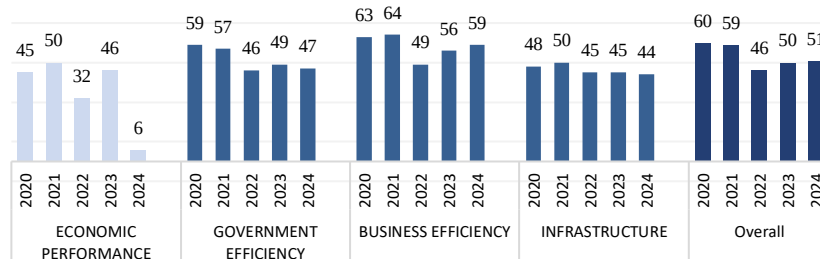
Table 2 Competitiveness factor rankings of Croatia and Slovakia

	Economic Performance					Government Efficiency					Business Efficiency					Infrastructure				
	Domestic	International	International	Employment	Prices	Public Finance	Tax Policy	Institutional	Business	Societal	Productivity	Labour Market	Finance	Management	Attitudes	Basic structure	Technological	Scientific	Health	Education
H R (51)	50	19	63	63	23	41	53	45	49	36	46	66	47	63	62	50	51	49	38	42
S K (59)	47	36	66	57	39	62	54	55	61	45	32	65	60	48	67	47	48	48	44	48

Source: IMD, 2024

In contrast to Slovakia, Croatia—despite also being ranked among the less competitive countries—has managed to significantly improve its position since 2020, moving up from 60th to 51st place. Over the past five years, the most notable progress has been recorded in the area of economic performance, with substantial improvement also observed in government efficiency, according to the WCR subfactors.

Figure 7 Croatia - subdimensions of WCR index



Source: IMD, 2024.

In the context of fostering conditions for enhancing the competitiveness of the business sector, Croatia demonstrates several strengths. These include high-quality infrastructure, the availability of a skilled workforce, a high level of education, a well-developed financial sector, and strong cost competitiveness. Croatia's improved position in the World Competitiveness Ranking (WCR) is also supported by a favourable business environment, policy stability and predictability, and the effectiveness of the legal and regulatory framework.

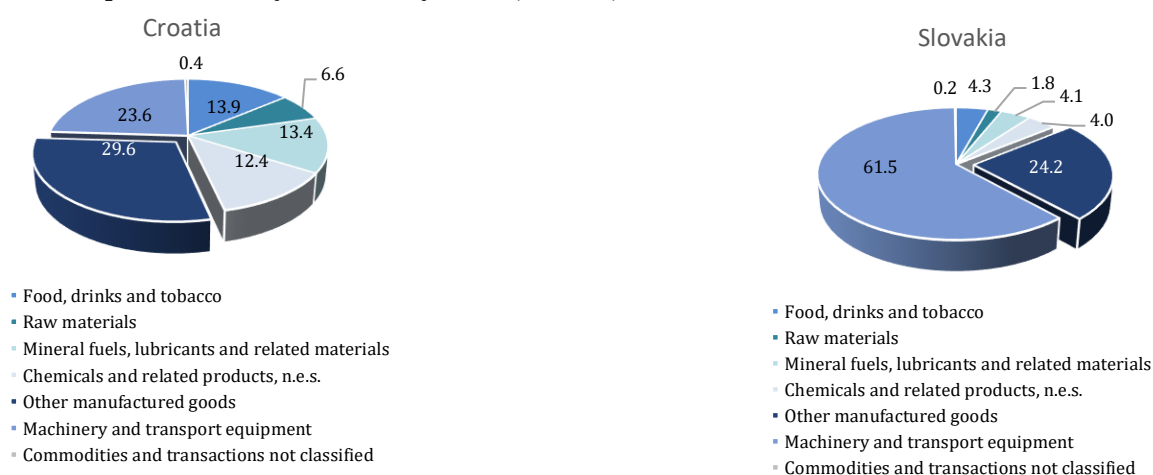
Competitiveness reflected in export structure

While the conditions for supporting competitiveness are undoubtedly the most important factor determining its overall level, it is also essential to consider a country's ability to maintain and increase its share in the global market. In this context, competitiveness is assessed as a firm's capacity to succeed through the quality and technological sophistication of its products. This reflects the direction of structural and adaptive processes, verified by the degree of effective integration into the international division of labour.

This approach to evaluating competitiveness is particularly relevant for small open economies—such as Slovakia, which is among the most open economies in the EU. The share of exports (goods and services) in GDP consistently exceeds 85%, with goods alone accounting for nearly 75.5%, despite a noticeable decline in recent years. However, Slovakia's openness also implies vulnerability due to the high concentration of export commodities, making its economy highly sensitive to external shocks. The current export structure demonstrates limited resilience to risks associated with slowing global economic growth, potential recessions in European and global markets, changes in international trade conditions, and geopolitical instability.

By contrast, Croatia is considered a less open EU economy, with exports of goods and services accounting for just under 50% of GDP—split roughly equally between goods and services. Unlike Slovakia, Croatia's export structure is significantly more diversified, enabling it to better mitigate risks stemming from current tariff and non-tariff barriers, including those arising from U.S. trade policy decisions. Croatia's key export commodities include mineral fuels and oils, electrical and electronic equipment, and machinery, including nuclear reactors. Approximately 3.4% of Croatian exports are destined for the United States.

Figure 8 Export commodity structure by SITC (2024, %)



Source: Eurostat, authors' calculations

Slovakia's exports are highly concentrated in a few key commodity groups—most notably, machinery and transport equipment, which account for nearly 62% of the country's total exports. The dominant position of this category is largely driven by the export of passenger cars. Slovakia's heavy reliance on the automotive industry currently represents a potential "ticking time bomb" for the competitiveness of its exports. Proposed U.S. tariffs on automobile imports would have a significant impact on Slovakia, as it is the third-largest exporter of passenger

vehicles to the U.S. among European countries. Automobiles and automotive parts make up over 73% of Slovakia's total exports to the United States.

An important dimension of export competitiveness lies in its factor intensity (Yilmaz, 2002, Havik and McMorrow, 2006). This aspect has gained increasing relevance in today's environment, characterized by volatility in factor markets, shifts in the flow of tradable commodities, and economic uncertainty in destination markets. In terms of factor intensity, a major vulnerability of Slovakia's exports is their high capital intensity, which also entails increased energy demand. Compared to Croatia, the capital intensity of Slovak exports is more than 2.8 times higher (see Table 2). Unlike Croatia, Slovakia has experienced a long-term increase in the capital intensity of its export structure.

Despite the fact that both countries have experienced a decline in labour-intensive exports over the past quarter-century, the labour intensity of Croatia's exports remains nearly ten percentage points higher than in Slovakia.

Table 3 Breakdown of total exports by factor intensity

		SK	HR	
Raw-material intensive	2000	13.1	29,4	
	2010	11.5	31,2	
	2020	7.3	33,9	
	2023	8.0	28,5	
Labour intensive	2000	22.6	22,5	
	2010	14.4	21,7	
	2020	12.7	20,2	
	2023	11.6	21,4	
Capital intensive	2000	35.6	13,9	
	2010	32.2	14,5	
	2020	43.3	16,8	
	2023	45.2	16	
Research-intensive goods	Easy-to-imitate	2000	7.3	12
		2010	21.3	10,3
		2020	14.7	9
		2023	11.3	9,8
	Difficult-to-imitate	2000	21.4	22,2
		2010	20.5	22,4
		2020	22.0	20,1
		2023	23.9	24,3

Source: Eurostat, authors' calculations.

This suggests a more effective utilization of human capital in Croatia's export-oriented sectors. The share of research-intensive exports shows only minor differences between the two countries. A positive development, however, is the slight increase observed in both countries in the share of hard-to-imitate, research-intensive products—a segment that tends to be the least vulnerable to cyclical downturns.

CONCLUSIONS

The comparative analysis of Slovakia and Croatia within the broader context of EU and global competitiveness highlights a persistent divergence in performance among EU Member States. Despite numerous strategic initiatives over the past decades aimed at strengthening competitiveness, the European Union continues to grapple with structural fragmentation and uneven implementation of reforms. While a few Member States, such as Denmark and Ireland, maintain strong positions in global competitiveness rankings, the majority—particularly among newer members—struggle to close the gap. This underscores the limitations of a one-size-fits-all strategy and emphasizes the need for tailored national reforms aligned with local institutional and economic contexts.

Slovakia's position at the bottom of the EU competitiveness rankings is driven by long-standing deficiencies in government and business efficiency, a lack of progress in labour market reforms, and insufficient adaptation to structural challenges in education, innovation, and digital transformation. The country's export structure—highly concentrated in the automotive sector and heavily reliant on capital-intensive production—further increases its vulnerability to external shocks and policy changes, such as potential U.S. tariffs. These weaknesses highlight the critical need for Slovakia to prioritize quality-driven growth, including policies that foster innovation, adaptability, and human capital development.

By contrast, Croatia has demonstrated that sustained progress in competitiveness is possible even among EU economies that initially lag behind. Its steady advancement in areas such as infrastructure, government efficiency, and economic performance—alongside a more diversified and resilient export structure—offers valuable lessons for other member states. Croatia’s gradual yet consistent reforms, coupled with a stronger emphasis on education and the business environment, suggest that well-targeted policy efforts can yield meaningful improvements, even within constrained fiscal and institutional environments.

Looking ahead, the path to improved competitiveness for less advanced EU countries requires a shift from declarative strategies to concrete, measurable reforms that address the qualitative drivers of productivity. While external benchmarking remains useful, domestic institutional reform, strategic sectoral support, and greater coherence between national policies and EU-wide goals will be essential. Incorporating these elements into future policy frameworks, complemented by performance-based assessment tools such as Data Envelopment Analysis (DEA), could help identify best practices and more effectively guide Member States on their path toward greater competitiveness and resilience in the global economy.

ACKNOWLEDGEMENT

This research is part of the project VEGA 2/0001/22 “Slovakia 2030”.

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FACTORS OF LONG-TERM VIABILITY AND SHORT-TERM SUCCESS IN BUSINESS SYSTEMS

Sara Kremsar¹, Eva Krhač Andrašec² and Tomaž Kem³

Abstract:

Despite growing interest in organizational resilience, academic literature remains fragmented in distinguishing between the factors that enable the long-term viability of business systems and those that contribute to short-term success. While many studies emphasize operational efficiency and immediate results, insufficient attention is given to the question of what allows business systems to endure, remain stable, and resilient over extended periods.

Based on a systematic literature review, this study examines the differences and possible connections between the factors of long-term viability and short-term success in business systems. The review results provide a theoretical foundation for understanding how individual factors contribute either to organizational stability and resilience or to immediate operational outcomes.

The discussion presents a conceptual framework based on analyzed sources, offering a structured placement of long-term viability factors according to their function and influence in different business contexts. The findings suggest that while short-term success factors are critical for achieving immediate results, they do not ensure viability, long-term stability, or resilience.

The study serves as a basis for further empirical research and proposes the development of a model for classifying factors as internal or external and mapping them according to their role, time frame, impact, and connection to operational objectives.

Keywords: business systems, short-term success factors, long-term viability factors, organizational change

INTRODUCTION

Definition of the Research Problem

The long-term viability of business systems is a critical but underexplored area in organizational studies. In a rapidly changing and unpredictable business environment, business systems often face challenges that affect their stability, resilience, and sustainable functioning. Existing research mostly focuses on short-term success factors, such as profitability, innovation, and market share, while questions about the factors that keep business systems operating for decades or even centuries remain relatively unexplored.

Long-term viability is not the result of a single factor, but the outcome of vision and coordinated functioning across multiple organizational dimensions, such as structure, strategy, culture, and adaptability to change. Emphasis is placed on organizational health (McKinsey, 2024), diversity and adaptability of business systems (Joseph et al., 2025), and the influence of external factors such as economic policy and market dynamics (Rajter & Križman, 2011).

Foundational organizational theories highlight the link between strategy and structure (Chandler, 1962), the importance of appropriate organizational design (Mintzberg, 1979), and the adaptation of structure in response to external conditions (Burns & Stalker, 1961). Innovation capacity is identified as a key survival factor in a changing environment, as organizations that fail to adapt become vulnerable (Christensen, 1997). Vision, culture (Collins & Porras, 1994), and the integration of sustainability approaches (Elkington, 1997) also contribute to the long-term stability of business systems.

Many business systems fail regardless of their past success. A well-known historical case is Eastman Kodak, a global leader in film photography, which developed the first digital camera as early as 1975 but failed to respond in time to the rise of digital technology. Due to its lack of reaction to this disruptive shift, the company filed for bankruptcy in 2012 (Mui, 2012; Lucas et al., 2009).

The key research question thus concerns the identification of factors that enable business systems to achieve long-term viability. It is also necessary to distinguish between factors characteristic of long-term viability and those associated with short-term success.

The Importance of Long-Term Viability in Business Systems

Short-term success is often easily measurable using financial indicators, market share, or innovation rates (Blasini et al., 2013). However, it remains unclear which factors truly enable business systems to maintain long-term

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stability, resilience, and relevance. The failure of many business systems despite promising early results (Ortiz-de-Mandojana & Bansal, 2015) highlights a clear difference between short-term success factors and those that support long-term viability.

The research problem arises from the need to systematically identify the factors that enable business systems to remain viable under different environmental and developmental conditions. Special attention must be given to understanding how organizations can develop strategies to strengthen their long-term resilience (McKinsey & Company, 2024). Despite the existence of foundational theoretical models—such as the principle that structure should follow strategy (Chandler, 1962)—there is a lack of studies that holistically connect internal and external influences with long-term viability.

Long-term viability plays a key role in ensuring economic stability, fostering sustainable growth, and enhancing innovation capacity in society. Unlike short-term goals, which focus on immediate outcomes, a long-term orientation requires a deeper understanding of overall organizational functioning. This includes areas such as organizational culture, structure, strategic management, and adaptability (Reeves et al., 2016).

Business systems that survive economic crises, technological changes, and shifts in customer behavior typically rely on a clear vision, strong values, and proactive adaptation mechanisms (Collins & Porras, 1994). Jeurissen (2000) also highlights the impact of the triple bottom line, as defined by Elkington (1997), where long-term growth is achieved by integrating environmental, social, and economic aspects of business.

The role of long-term viability is becoming increasingly important in the context of global uncertainty and instability. Only business systems with strong internal resilience and external adaptability are able to remain competitive and successful in the long run. Research by Joshi and Roh (2009) emphasizes the value of diversity in leadership and teams, as it enables faster responses to change and strengthens an organization's ability to manage complex challenges.

Objectives and Research Questions

Business systems that achieve long-term viability often differ significantly from those demonstrating short-term success. Understanding these differences is a key area of research, as it enables the development of strategies that go beyond immediate outcomes and support long-term resilience and viability.

The aim of this study is to review and analyze existing scientific literature on long-term viability factors and short-term success factors in business systems and to build a theoretical foundation for further research. The objective is to identify, categorize, and evaluate the factors that influence long-term viability and clearly distinguish them from those contributing to short-term success. Another goal is to identify which factors overlap or align, and which are contradictory or mutually exclusive.

This proposed research also serves as a basis for designing a theoretical framework to guide the development of a research methodology. This includes the formulation of research questions, the selection of suitable methods, and the preparation of research tools, such as questionnaires and structured interviews. The theoretical analysis will support the creation of a model that serves as a research artifact and will help define specific areas that require further investigation.

The proposed study serves as preparation and conceptual design for a larger research effort to be conducted as part of a doctoral dissertation. The objective of the dissertation is to develop a theoretical foundation for constructing a model that will later be empirically validated through doctoral research.

The core research questions guiding the development of the theoretical framework and the preparation for empirical validation include:

- What are the key factors that enable the long-term viability of a business system?
- How do these factors differ from those that contribute to short-term success?
- How can identifying these factors enhance the resilience, strategic stability, and sustainable competitiveness of business systems?

The expected results of this study are based on a systematic literature review and theoretical synthesis. These results will serve as a foundation for the development of a research model and methodological tools and will be further explored and empirically validated in later research phases, including:

- the development of a list of key long-term viability factors in business systems,
- the distinction between long-term viability and short-term success factors,
- analysis of these factors in terms of effectiveness and performance,
- recommendations for improving long-term business system stability,
- contributions to academic knowledge in the field of organizational resilience.

The expected outcomes do not provide final empirical findings but introduce and justify the theoretical foundations for a doctoral dissertation that will be supplemented with empirical data.

METHODOLOGY

This research is based on a literature review aimed at analyzing scientific sources and identifying key findings, concepts, and thematic clusters related to the long-term viability and short-term success of business systems. The review focuses on academic contributions that address long-term performance and resilience in business systems, as well as the influence of internal and external factors on business operations.

The multidisciplinary database SCOPUS was used for searching and collecting scientific sources, with a focus on peer-reviewed journal articles and studies directly related to the field of long-term viability and short-term success in business systems.

The literature review was conducted in several phases:

1. Formulation of search terms, including core concepts and their combinations: *"organizational longevity," "business resilience," "long-term business survival," "organizational lifecycle," "short-term success factors,"* and *"organizational effectiveness."* Logical operators **AND** and **OR** were used, along with filters based on subject area and document type.
2. Execution of the search in the SCOPUS database, with results further limited to journal articles, peer-reviewed publications, and contributions relevant to organizational development, strategic management, and sustainable business.
3. Elimination of irrelevant and duplicate sources, removing articles not directly addressing long-term viability or short-term success of business systems, or those dealing solely with technical, industry-specific, or narrowly specialized content without broader organizational relevance.
4. Content analysis of selected studies, including an assessment of their relevance to the research problem, usefulness of theoretical frameworks, and contribution to forming a comprehensive understanding of the factors influencing long-term viability and short-term success in business systems.

Microsoft Excel was used to organize and analyze the data, enabling structured classification, categorization, and visualization of results using charts and tables.

The outcome of this process is a set of key scientific sources that form the theoretical foundation of the study and provide the basis for further analytical exploration of selected factors.

RESULTS

Defining the Long-Term Viability in Business Systems

Long-term viability refers to the ability of business systems to survive, remain stable, and grow over an extended period. It encompasses resilience to external pressures and market changes, as well as proactive adaptation, innovation, and the creation of sustainable value for all stakeholders. The concept of long-term viability is closely linked to maintaining a competitive advantage, which enables the long-term success of a business system (Barney & Hesterly, 2015).

Key elements influencing long-term viability include strategic planning, effective resource management, and the ability to adapt to changing market conditions. Business systems that develop agile organizational structures and a culture of continuous learning are generally better prepared to respond to global competition and technological advancements (McEvily et al., 2004).

In a rapidly changing business environment, the importance of long-term viability continues to grow. Business systems are increasingly exposed to globalization, digitalization, and unpredictable external conditions. Long-term viability allows not only survival but also the ability to seize opportunities that arise from technological innovation and shifts in consumer behavior. This capability forms the foundation for stable and sustainable development at both microeconomic and macroeconomic levels (Lăzăroiu et al., 2020).

Long-term viability is shaped by both internal and external factors. Internal factors stem from the structure and operation of processes within business systems, while external factors relate to the broader social, economic, and technological environment (Bukovšek, 2017).

Internal factors primarily include organizational culture, system structure, leadership quality, and innovation capacity (Hove et al., 2013). A culture grounded in values such as collaboration, innovation, and responsibility creates an environment that supports long-term development. A flexible and functional organizational structure enables effective resource allocation and fast response to environmental changes. Leadership plays a crucial role in guiding actions at all organizational levels (Srimulyani et al., 2023), especially when promoting transparency, open communication, and interdepartmental collaboration (Hughes, 2016). Innovation capacity contributes to the development of new products, services, and processes, supporting sustained competitive advantage (Shatilo, 2019).

External factors include changes in legal and regulatory frameworks, economic cycles, technological advancement, and consumer behavior (Daily et al., 2001). Globalization and digitalization present new opportunities while increasing complexity and the need for rapid adaptation. Economic conditions such as inflation, recession, and periods of growth directly influence the strategic decisions of business systems (Xue, Shen & Hsieh, 2019).

Technological enablers, such as automation, digital transformation, and artificial intelligence, enhance operational efficiency but require high levels of adaptability and openness to change. End-user or customer behavior, shaped by social trends, demographic shifts, and technological innovations, pushes business systems to continuously adapt their product and service offerings (Dubitskaya & Tcukanova, 2018).

Key Factors of the Long-Term Viability of Business Systems

The review of existing literature reveals a wide range of internal factors recognized by many authors as critical to the long-term viability of business systems, including:

- organizational culture (Shveda et al., 2024; Kirchmer, 2008),
- business system structure (Viaene & Van den Bergh, 2018; Jakoubi et al., 2007),
- leadership quality (Rubakha et al., 2024; Macuzić et al., 2016),
- innovation capabilities (Shveda et al., 2024; Kirchmer, 2008),
- financial stability (Rubakha et al., 2024),
- operational efficiency (Kirchmer, 2008; Macuzić et al., 2016),
- employee engagement (Viaene & Van den Bergh, 2018),
- technological capabilities (Shveda et al., 2024; Belesioti et al., 2021),
- systematic knowledge management (Shveda et al., 2024; Kirchmer, 2008).

Organizational culture emphasizes innovation, collaboration, and transparency (Shveda et al., 2024; Kirchmer, 2008). The structure of the business system is crucial, as it includes flexibility, clearly defined roles and responsibilities, and effective communication between departments (Viaene & Van den Bergh, 2018; Jakoubi et al., 2007). Leadership quality is closely linked to managerial competencies, strategic thinking, and support for teamwork and employee development (Rubakha et al., 2024; Macuzić et al., 2016). Innovation capabilities also play an important role. They involve the use of new technologies, the development of products and services, and adaptation to market changes (Shveda et al., 2024; Kirchmer, 2008). Financial stability allows for effective asset management, low debt levels, and long-term investment in growth (Rubakha et al., 2024). Operational efficiency is key to optimizing business processes and reducing costs. It also supports the use of performance and efficiency indicators (Kirchmer, 2008; Macuzić et al., 2016). Employee engagement, including motivation and satisfaction, affects talent retention and creates opportunities for advancement (Viaene & Van den Bergh, 2018). Technological capabilities, such as process digitalization, data management, and cybersecurity, provide a competitive advantage (Shveda et al., 2024; Belesioti et al., 2021). Finally, systematic knowledge management is essential for long-term success. It includes knowledge sharing, continuous learning, and building intellectual capital (Shveda et al., 2024; Kirchmer, 2008).

The literature also highlights fundamental external factors that significantly influence the long-term viability of business systems, including:

- macroeconomic conditions (Rubakha et al., 2024),
- regulatory framework (Shveda et al., 2024),
- technological advancement (Shveda et al., 2024; Belesioti et al., 2021),
- market trends (Viaene & Van den Bergh, 2018),
- consumer behavior (Evans, 2001),
- globalization (Rubakha et al., 2024; Macuzić et al., 2016),
- environmental factors (Vedula et al., 2024),
- geopolitical influences (Belesioti et al., 2021),
- social factors (Evans, 2001),
- innovation environment (Shveda et al., 2024; Kirchmer, 2008),
- logistical factors (Vedula et al., 2024),
- risks and unforeseen events (Rubakha et al., 2024).

Macroeconomic conditions, such as economic growth, inflation, interest rates, and currency fluctuations, can significantly influence company business models (Rubakha et al., 2024). The regulatory framework, which includes legislative changes, environmental standards, and tax policy, defines the operational conditions for companies (Shveda et al., 2024). Technological advancement, especially in the form of artificial intelligence, automation, and emerging tech trends, enables companies to renew processes and drive innovation (Shveda et al., 2024; Belesioti et al., 2021). Market trends, including changing consumer preferences, the growth of niche markets, and competitive dynamics, require continuous business adaptation (Viaene & Van den Bergh, 2018).

Additionally, consumer behavior, shaped by social influences, demographic changes, and rising expectations for sustainability, plays a key role in shaping products and services (Evans, 2001). Globalization opens access to international markets while increasing risks related to global supply chains and geopolitical challenges (Rubakha et al., 2024; Macuzić et al., 2016). Environmental factors, such as climate change and pressures for sustainable and green development, are becoming increasingly important for companies seeking long-term viability (Vedula et al., 2024). Geopolitical influences, including regional political stability, sanctions, conflicts, and trade wars, can cause major business disruptions (Belesioti et al., 2021). Social factors, such as education systems and cultural differences, shape the availability of skilled labor and influence collaboration in the global market (Evans, 2001). The innovation environment, which includes access to research centers, innovation grants, and partnerships with academic institutions, supports the development of new technologies and processes (Shveda et al., 2024; Kirchmer, 2008). Logistical factors, such as supply chain stability, transportation costs, and the availability of raw materials, remain critical for uninterrupted business operations (Vedula et al., 2024). Finally, risks and unforeseen events, such as natural disasters, financial disruptions, and health crises (e.g. the COVID-19 pandemic), are important factors that challenge and test the resilience of business systems (Rubakha et al., 2024).

Defining the Short-Term Success in Business Systems

Short-term success in a business system refers to the achievement of desired results within a relatively short timeframe, most commonly within a quarter or fiscal year. It focuses on immediate efficiency, profitability, and the execution of operational goals directly linked to daily processes and the system's responsiveness to changes in the business environment (Marginson et al., 2010).

Short-term success is based on achieving business outcomes such as revenue growth, market share expansion, improved profitability, or operational efficiency. It targets measurable, quantitative goals and is often the result of responsive strategies, the exploitation of market opportunities, and internal management optimization (Hitt et al., 2015).

It is important to distinguish between the concepts of efficiency and effectiveness. Efficiency refers to performing tasks with minimal resources and maximum output, while effectiveness refers to achieving defined goals and outcomes. An organization can be efficient but not necessarily effective if it fails to meet its objectives. In production systems, efficiency is often measured by the input-output ratio, whereas in the service sector, performance measurement tends to be more complex and requires a broader contextual approach (Kremsar, 2021). In our preliminary research (Kremsar et al., 2025), process management was clearly identified as a key factor in short-term success. The findings highlight the importance of internal factors such as leadership quality, information system efficiency, and organizational structure, all of which contribute to process stability, cost control, service quality, and meeting deadlines.

Despite the importance of short-term success, there is a risk that business systems may become overly focused on immediate results while neglecting long-term sustainability. Elkington (2004) warns of the so-called "quarterly capitalism," where strategic direction is subordinated to short-term financial targets, ultimately threatening the system's long-term stability and adaptability.

Although short-term success factors are essential for ensuring liquidity, improving efficiency, and achieving early-stage growth, research warns that their excessive use can create a false sense of stability. Business systems that ignore strategic, cultural, and structural dimensions of organizational development often face greater difficulty in ensuring long-term viability (Eccles et al., 2014).

Short-term success is therefore a significant but insufficient condition for long-term stability. Its role is primarily tactical and focused on immediate outcomes, rather than on building the foundations of organizational resilience and sustainable development.

An important framework for measuring short-term objectives is the Balanced Scorecard methodology. It enables the integration of financial and non-financial indicators, as well as operational and strategic goals, into a unified performance monitoring system (Kaplan, 2012). The results achieved through this approach reflect not only short-term efficiency but also the system's contribution to long-term orientation.

Key Factors of Short-Term Success in Business Systems

The literature identifies the following key factors of short-term success:

- financial performance (Kaplan & Norton, 2000; Hitt, Ireland & Hoskisson, 2015),
- process efficiency (Hammer & Stanton, 1999; Bakotić & Krnić, 2017),
- customer satisfaction (Reichheld, 2003; Kumar et al., 2013),
- employee productivity (Bailey et al., 2018; Bakotić & Krnić, 2017),
- performance indicator management (KPI) (Kaplan & Norton, 2000; Bailey et al., 2018),
- process digitalization (Hammer & Stanton, 1999),
- agility and responsiveness to market changes (Hitt, Ireland & Hoskisson, 2015; Bakare et al., 2020),

- strategic human resource management (Bailey et al., 2018),
- motivational systems and goal orientation of employees (Bailey et al., 2018; Bakotić & Krnić, 2017),
- ability to create added value in a limited time (Marginson et al., 2010; Kaplan, 2012),
- link between operational results and customer satisfaction (Kumar et al., 2013; Bakare et al., 2020),
- use of the Balanced Scorecard (Kaplan & Norton, 2000; Marginson et al., 2010).

Short-term success in business systems is based on multidimensional performance that combines financial performance, process efficiency, customer satisfaction, and employee productivity. Financial outcomes such as revenue, profit, EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization), and return on investment (ROI) are the most commonly used indicators of short-term performance, as they directly reflect value creation and liquidity maintenance. These indicators are often included in comprehensive performance management systems such as the Balanced Scorecard, where they represent one of the four core perspectives (Kaplan & Norton, 2000).

Alongside financial aspects, process efficiency plays a key role. It includes indicators such as cycle time, cost per unit, and resource utilization, and contributes to greater operational performance and adaptability. Business systems that invest in business process reengineering and digitalization tend to respond more quickly to market changes and reduce internal inefficiencies (Hammer & Stanton, 1999). Further research confirms that process improvements also positively affect employee motivation, which further enhances organizational performance (Bakotić & Krnić, 2017).

Customer satisfaction also directly impacts system efficiency and is one of the core factors of short-term success, as it affects market share, retention, and profitability. Business systems with high Net Promoter Score (NPS) values tend to achieve above-average growth, confirming a direct link between customer satisfaction and business performance (Reichheld, 2003; Kumar et al., 2013). Internal organizational performance, particularly employee productivity, plays an important role in shaping customer satisfaction. Employee productivity is directly related to task execution efficiency and the quality of work processes.

Strategic human resource management, which includes clear goal-setting, motivational systems, and KPI monitoring, enhances operational efficiency and supports the achievement of short-term objectives (Bailey et al., 2018). High employee engagement enables faster project execution and better responsiveness to market changes. The connection between operational efficiency, customer satisfaction, and financial performance is especially evident in small and medium-sized business systems, where changes in individual factors have an immediate impact on overall performance (Bakare et al., 2020).

In this conceptual phase of the research, based on the reviewed literature and with future research in mind, we propose grouping short-term success factors into six key categories. These categories are interconnected, but each plays a specific role in ensuring the short-term success of business systems. Together, they form a dynamic analytical framework that explains the multidimensional nature of short-term success and enables a comprehensive analysis of influencing factors at different organizational levels.

1. **The financial efficiency and economic value category** includes factors that directly impact cash flow, profitability, and other financial indicators such as EBITDA, ROI, and revenue. These are core indicators of short-term performance, as they reflect the company's ability to generate tangible value within a limited timeframe.
2. **The operational efficiency and process agility category** covers factors related to internal process optimization, digitalization, resource utilization, and productivity. These factors enable quick adaptation to environmental demands and the efficient execution of key tasks within the business system.
3. **The leadership and strategic execution category** includes systems and approaches that support the achievement of short-term goals through clearly defined performance indicators (KPIs), the use of methodologies such as the Balanced Scorecard, tactical decision-making, and monitoring of results. This category ensures alignment between daily activities and overall business strategy.
4. **The human resources and internal capabilities category** emphasizes the importance of employee motivation, strategic HR management, and productivity. Employees are a critical resource for executing short-term goals, making this category directly relevant to project success and operational efficiency.
5. **The market responsiveness and customer value category** includes factors such as customer satisfaction, the ability to respond quickly to changes in demand, and offer customization. These contribute to maintaining or increasing market share and improving the company's short-term profitability.
6. **The innovation and technological capabilities category** addresses the business system's ability to implement new technologies, digital tools, and adapt to technological trends. Time-to-market and the

ability to rapidly deploy technological solutions are key competitive advantages in the modern business environment.

DISCUSSION

Definition of Terms and Conceptual Gaps

In the existing literature, many fundamental concepts, such as viability, sustainability, durability, resilience, stability, and relevance, remain terminologically unclear, disconnected, overlapping, or inconsistently defined. This fragmentation in terminology makes it difficult to develop a coherent theoretical framework that could serve as a solid foundation for further empirical research. In the next stages of the study, we aim to define and distinguish these terms with precision and clarity, and to test their alignment with existing conceptual frameworks. This approach will contribute significantly to the unification of terminology and will strengthen the theoretical foundation for further analysis of long-term viability and short-term success factors in business systems.

In-Depth Analysis of Long-Term Viability Factors in Business Systems

The topic of long-term viability in business systems is often addressed indirectly in the academic literature or approached with a limited disciplinary focus. Most available studies concentrate on specific areas, such as strategy, finance, or organizational design, while comprehensive approaches that integrate interdisciplinary perspectives and capture the dynamic nature of business system factors remain rare. In the next steps of the research, we plan to conduct an extended systematic review that will include additional databases and repositories such as Web of Science (WoS), Science Direct, Emerald, ProQuest, and Google Scholar. This will address existing methodological limitations related to relying solely on the SCOPUS database and will enhance the diversity and coverage of scientific sources. Special attention will be given to peer-reviewed publications and empirical studies that examine the long-term structural characteristics of business systems and their influence on sustainability, resilience, and adaptability over time.

In-Depth Analysis of Short-Term Success Factors in Business Systems

Existing academic literature shows a higher degree of exploration and systematization of short-term success factors compared to those related to the long-term viability of business systems. A review of the literature reveals that current approaches to short-term factors are often partial and fragmented, and are mostly based on operational, tactical, and one-dimensional indicators that only partially explain the short-term stability of business systems.

Based on the findings so far, the next steps of this research will focus on a comprehensive and systematic analysis of short-term success factors. We plan to develop a typology of these factors through thematic analysis and classify them into clearly defined analytical categories. To ensure the validity of the conceptual framework, we intend to conduct an additional study aimed at empirically validating key short-term performance indicators, such as EBITDA, revenue, market share, marketing responsiveness, and other comparable metrics.

Complementing the theoretical review with additional sources, such as reports from bankruptcy administrators, analyses of failed companies, and other available secondary databases, could also significantly contribute to a more comprehensive understanding of influencing factors. This would allow for validation of results through different analytical approaches. Such an expanded framework would strengthen the theoretical foundation and increase the reliability of future empirical findings.

The Connection Between Long-Term Viability Factors and Short-Term Success Factors

Many key concepts such as efficiency, productivity, ROI, KPI, and customer satisfaction are frequently discussed in isolation in the existing literature, without proper contextual integration into the long-term perspective of business systems. We believe that this fragmentation limits the understanding of the full dynamics of business systems and complicates the development of integrated and time-sensitive models of efficiency and performance.

We argue that there is a significant overlap between short-term and long-term factors, although the role of individual factors changes depending on the time perspective. Some factors influence both long-term viability and short-term success, but with different weight, function, or impact. For example, innovation in the early stage of a company often acts as a driver of rapid growth and market positioning, while in later stages it becomes a key element of long-term competitiveness and sustainable development.

Conversely, we also believe that some factors are specific only to long-term viability or only to short-term success. For instance, systematic knowledge management does not have a direct impact on short-term outcomes but contributes significantly to resilience, learning, and continuity over time. The same applies to other strategic factors

such as culture, vision, and sustainability orientation, which are less reflected in short-term indicators but are essential for long-term viability.

We believe that the current research gap in connecting these two dimensions is a barrier to developing comprehensive approaches to measuring and understanding business system performance. We propose that future research focus on a comparative empirical analysis of factors that appear in both perspectives. We also suggest developing typologies that allow for a better understanding of the temporal dynamics of their influence across different stages of business system development. This approach would support better alignment between strategic and operational decisions and enhance the overall resilience of business systems.

Research Limitations

A limitation of the present study is the use of only one database, specifically the SCOPUS database. This means that some potentially relevant sources were not included in the research. We believe this creates a risk that the literature review may be incomplete or unbalanced, which could affect the comprehensiveness of the analysis and the breadth of the theoretical framework.

In the doctoral dissertation, we intend to conduct an expanded systematic literature review that will also include other relevant academic databases and repositories, such as Web of Science (WoS), ScienceDirect, Emerald, ProQuest, and Google Scholar. This will allow us to capture a broader range of peer-reviewed articles and studies addressing topics related to the long-term viability of business systems and short-term success.

In the next stages of the research, the focus will be on an in-depth analysis of sources with a high level of academic relevance and impact, which will support the development of a more robust theoretical foundation. By including additional databases, the risk of omission will be reduced, and the credibility and reliability of the findings will be enhanced.

CONCLUSION

This research focused on reviewing academic literature and identifying the factors that influence the long-term viability and short-term success of business systems. Although the initial objective was achieved by establishing a preliminary set of factors, the literature review revealed several content-related and methodological gaps. These were addressed in detail in the discussion section, where we proposed directions for further research.

Based on the review, we propose a research hypothesis that long-term viability in business systems is based on the coordinated interplay of internal and external factors. Future research will therefore focus on testing this hypothesis and developing an empirical model of long-term viability. We also propose the development of a parameter matrix that will show how the importance, function, and occurrence of specific factors change depending on the business system's development stage.

The research has highlighted several open questions that require additional methodological treatment. These include unclear definitions of fundamental concepts, disconnected theoretical perspectives, and a lack of integration between theoretical foundations and the research framework. Addressing these issues will likely require a preliminary study and the development of additional academic contributions to support better understanding and methodological positioning of the proposed approaches. The methodological framework will be based on thematic and comparative analysis, along with the use of an analytical factor card to systematically classify the factors by function, origin, temporal impact, and level of influence. A preliminary academic publication is also recommended, which would help validate the research approach and reinforce the foundation for the empirical model.

The proposed analytical factor card will also play an important role in the next phases of the research. It will serve as a tool for the structured classification of factors by key parameters, including organizational function, origin, timeframe of influence, and systemic impact. The analytical card will ensure clarity, comparability, and provide the basis for quantitative processing. It will be linked to the thematic and comparative analysis, which will support examining the differences between short-term and long-term factors. A dedicated academic publication focused on methodological validation is also recommended as a foundation for the empirical phase.

We have also found that some factors appear in both dimensions (short-term and long-term), although their function and meaning vary depending on the timeframe. On the other hand, some exclusive factors are specific to only one of the two dimensions. These contrasts present a challenge for business management, as they can lead to

misalignment between strategic goals and operational decisions. If leadership fails to recognize these tensions in time, it may jeopardize the overall stability of the business system.

Future research will focus on the following questions: What are the key factors of long-term viability? How do they differ from those that support short-term success? And how can the timely identification of these factors improve the resilience and sustainable competitiveness of business systems? The aim of the empirical phase will be to design a conceptual model of long-term viability in business systems, based on a combination of theoretical and empirical findings. The model will enable the identification and classification of factors according to their temporal dynamics, strategic relevance, and occurrence in different development phases.

Through the conducted systematic literature review and conceptual analysis, we have established an initial typology of factors, proposed an analytical framework, and identified research and methodological gaps that will need to be addressed going forward. This research does not represent a final analysis but serves as a conceptual foundation for future phases. All proposed directions, methodological approaches, and model structures will be developed and empirically validated within the framework of the doctoral dissertation.

Understanding the relationship between short-term and long-term goals remains a central challenge. It is often more meaningful to perform the right activities with slightly lower efficiency than to execute the wrong activities with maximum efficiency. Organizations must first define clearly what they want to achieve and then plan the paths to reach those goals. Only in this way can they ensure that short-term results will also contribute to long-term stability and success.

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THE ROLE OF INFORMAL MARKETPLACES IN THE ECONOMIC SUSTAINABILITY OF SOUTH AFRICAN SMMES

Thato Moagi ¹, Peta Thomas² and Cashandra Mara³

Abstract:

This study aimed to address the lack of research on the challenges faced by African small, medium, and micro enterprises (SMMEs), operating in informal marketplaces. Research shows that SMMEs are a backbone to many African economies. Informal marketplaces pop up continually when several SMMEs group together to sell their wares and services. These offerings are generally of a nature as are required to maintain the everyday life of their customers. The marketplaces are vibrant and often attract many customers. However, being informal the marketplaces have no regulatory background planning. These extremely popular marketplaces facilitate SMME revenue generation contributing to job creation and poverty alleviation where formal employment opportunities are scarce. This qualitative study addresses the underexplored role of informal marketplaces in supporting SMME sustainability in Johannesburg, South Africa. Nine SMME stall owners operating in informal marketplaces were interviewed using an open-ended, semi-structured guide to give rich insight of the pros and cons of this business environment. Thematic analysis of the interviews highlighted informal marketplace challenges for stall vendors such as inadequate market infrastructure, and misunderstandings of business legal requirements but also highlighted low costs to operate there and the fact markets often appear where customers need them most such as near bus stops. The study recommendations underscore the need for improved understanding of African marketplace systems to enhance small business economic viability.

Keywords: Informal marketplace; economic sustainability; small, medium and micro enterprises; SMMEs

INTRODUCTION

This study aims to address the lack of research on the management, economics, operations, and challenges faced by informal small, medium, and micro enterprises (SMMEs), despite their significant roles in various marketplaces within global and African economies (Muriithi, 2017; Bushe, 2019). SMMEs, typically sole proprietorships, offer flexible employment and income generation opportunities, especially in economies with limited formal sector jobs (Bushe, 2019: 1). SMMEs operate within marketplaces that facilitate revenue generation through diverse product and service offerings, contributing to job creation and poverty alleviation where formal employment opportunities are scarce (Varnai, 2018; Makwara, 2019; Aldeehani, 2020). These marketplaces provide a conducive environment for SMME clustering, serving as platforms where businesses can operate regularly, unhindered, and foster growth (Ha, 2014: 5; WIEGO, 2022). SMME stall owners rely on marketplaces to generate profits and sustain their livelihoods by selling products and services to local communities (WIEGO, 2022). Marketplaces, defined as physical spaces facilitating buying and selling activities, serve as crucial economic platforms for informal SMMEs (80; Ha, 2014: 5; Petrovic et al., 2021: 1). However, there is a lack of a comprehensive theoretical framework to systematically investigate these marketplaces and their affordances in supporting SMME operations and contributing to national economic growth (Bushe, 2019). In South Africa, high unemployment rates and low job creation have driven many individuals to become informal SMME stall owners as a means of financial support (Bushe, 2019; Nieuwenhuizen, 2019; Ntuli, 2020: 36). Informal marketplaces in the country, such as those found near taxi ranks, railway stations, and bus stops, provide essential operational sites for SMMEs (Tong, 2014). Understanding the role of these marketplaces is crucial within the context of South Africa's 2030 National Development Plan (NDP), which aims to enhance economic sustainability (Davis, 2020: 6). This study contributes to understanding how the affordances provided by informal marketplaces impact livelihoods and national economic sustainability (World Economic Forum, 2023). The City of Johannesburg, the largest and wealthiest metropolitan municipality in South Africa, encompasses diverse areas such as Alexandra, the oldest and poorest township in the country (City of Johannesburg, 2020), Soweto, the largest township in South Africa (Maphela & Cloete, 2020), and the Central Business District (CBD), the financial hub not only of Johannesburg but also of the entire African continent (Statista, 2023). This study focuses on these areas due to their high concentration of informal marketplaces, driven by significant unemployment and poverty rates (Edonga, 2020). Townships, defined as local government units within counties, play a pivotal role in hosting many of these informal marketplaces (Haider, 2018). Figure 1 illustrates the locations of townships in South Africa, which assists in giving a clearer picture of just how the high number of informal marketplaces in the country:

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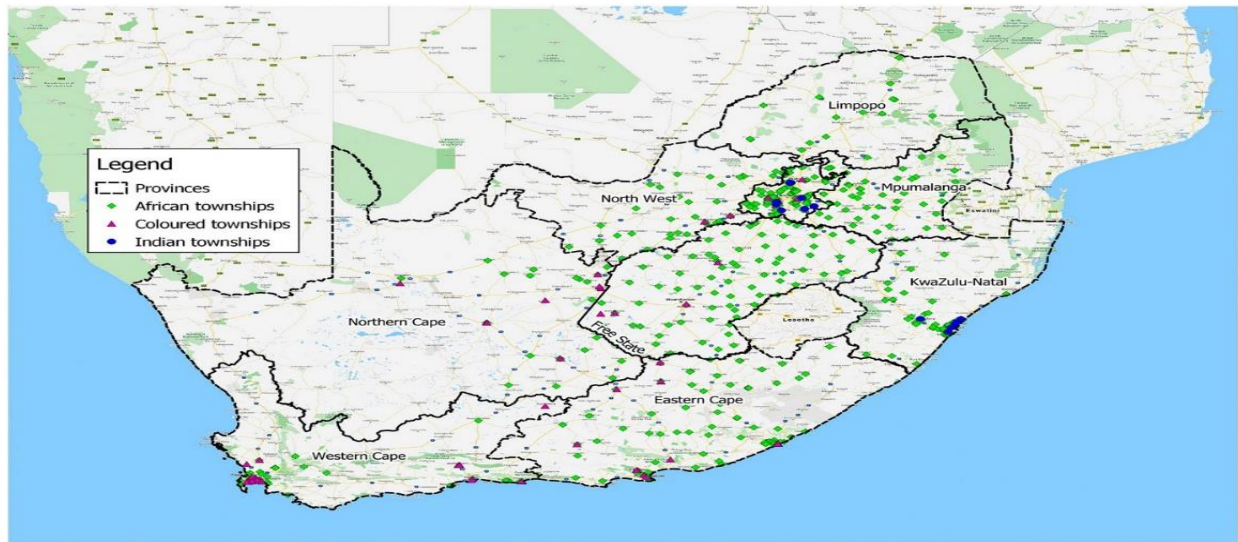


Figure 1: Locations of Townships in South Africa (Source: Currin, 2020) (Available from: <https://www.dailymaverick.co.za/article/2020-08-11-township-economies-must-be-a-key-focus-for-development-and-accurate-data-is-crucial/>).

From Figure 1, it is clear just how many townships and, subsequently informal marketplaces are scattered across the country. However, the main focus of this study are the informal marketplaces in Johannesburg, Soweto and Alexandra townships as illustrated in Figure 2.

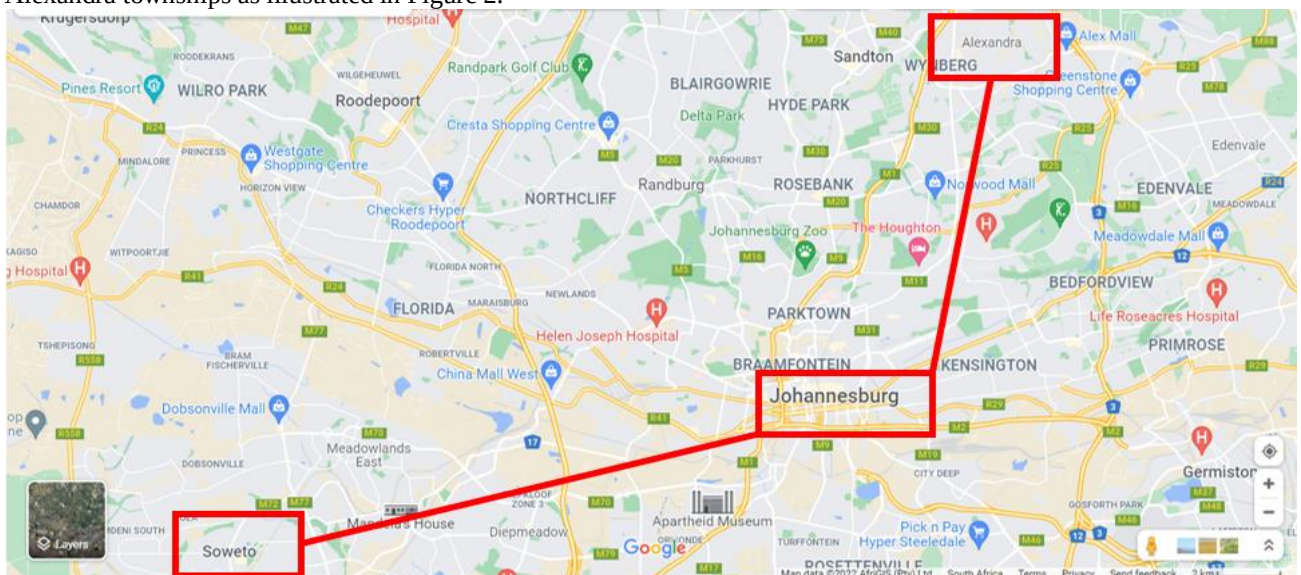


Figure 2: A map of Johannesburg indicating the location of Soweto township and Alexandra township, in relation to the CBD in Johannesburg, which are all located in Johannesburg (Source: Google Maps, 2021). Soweto is 23 kms from Johannesburg CBD and Alexandra is 18 kms from same. Recognising what is critical and important in terms of SMME support is crucial to their growth and economic sustainability as noted by several authors such as Seijaaka, Mindra & Nsereko (2015); Abisuga-Oyekunle, Patra & Muchie (2019: 12); Bushe (2019: 3), to name a few.

LITERATURE REVIEW

SMMEs, crucial for economic development (Roundy, 2017: 3; Cao & Shi, 2020), are independently-owned enterprises operated by entrepreneurs. They vary in size, often requiring low start-up capital (Bushe, 2019: 1). In South Africa, SMMEs exist formally and informally; the latter are unregistered, underdeveloped, and operate in the informal sector without paying taxes (SME South Africa, 2022). Globally, SMMEs constitute about 95% of enterprises, employing 60% of the private sector workforce (Nieuwenhuizen, 2019). While formal SMMEs dominate in developed countries, informal ones prevail in the Global South (Bushe, 2019; Moagi, 2021), contributing significantly to job creation, poverty alleviation, and economic stability, especially in regions like

Africa (Muriithi, 2017). Informal SMMEs play a crucial role by providing employment to the unemployed who cannot secure formal jobs (International Labour Organisation, 2018).

SMMEs on the African continent

The African continent ranks among the world's top ten fastest-developing economies as of 2021, according to the World Bank (2021). However, limited access to capital and funding poses significant challenges hindering SMME development and economic growth (Muriithi, 2017; Yasseen, Stegmann, & Crous, 2020). Insufficient entrepreneurial skills and education exacerbate these challenges (Moagi, 2019). Consequently, over 75% of SMMEs are self-financed, with only 10% having the necessary documentation for bank loans (European Investment Bank, 2018). In Africa, many SMMEs sustain themselves through sales in informal marketplaces (Bushe, 2019), which cater predominantly to the African population (Cant, Gopaul, & Manley, 2013). This trend is evident across the continent, including in North Africa, exemplified by Egypt's Khan El Khalili marketplace, operational since 1382 (Expat explore, 2019). As an informal marketplace, Roque Santeiro in Luanda, Angola, was considered to be the largest in terms of physical size in the world during the 1990s (Development Workshop, 2009: 26), as illustrated in Figures 3 and 4:



Figure 3: Photograph of Roque Santeiro marketplace in Angola during the 1990s revealing the big physical size of the marketplace that was deemed as the biggest in the world (Development workshop, 2009: 24) Available from: <https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/40346/128835.pdf>.



Figure 4: Photograph illustrating the typical layout of a vegetable section in Roque Santeiro marketplace (Development workshop, 2009: 26). Available from: <https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/40346/128835.pdf>.

Figures 3 and 4 reveal the potential size and untidy organisation of how a typical informal marketplace can become. An example of an informal marketplace in Southern Africa are linear marketplaces which are mainly located in the CBD of the City of Johannesburg in South Africa (Nemaungani, 2017).

A marketplace - an ‘umbrella’ for SMMEs.

A marketplace, typically a physical space, serves as an economic hub where SMME stall owners sell a variety of products and services to customers seeking quality items at discounted rates (Ha, 2014; Petrovic et al., 2021). Reasons for SMMEs opting for marketplaces include providing employment opportunities, supporting local communities, and facilitating flexible business operations (Ha, 2014; Bushe, 2019; WIEGO, 2022). Marketplaces also enhance visibility and popularity due to their central locations, allow for price negotiation, require minimal paperwork and startup capital, and involve lower financial risks compared to larger firms (Ha, 2014; Bushe, 2019; WIEGO, 2022). Additionally, formal marketplaces often provide aesthetically pleasing settings that encourage social interaction and relaxation for shoppers (Ha, 2014; Bushe, 2019; WIEGO, 2022). Figure 5 visually represents the symbiotic relationship between a marketplace and its SMMEs (Ha, 2014) as created by the researcher (2022):

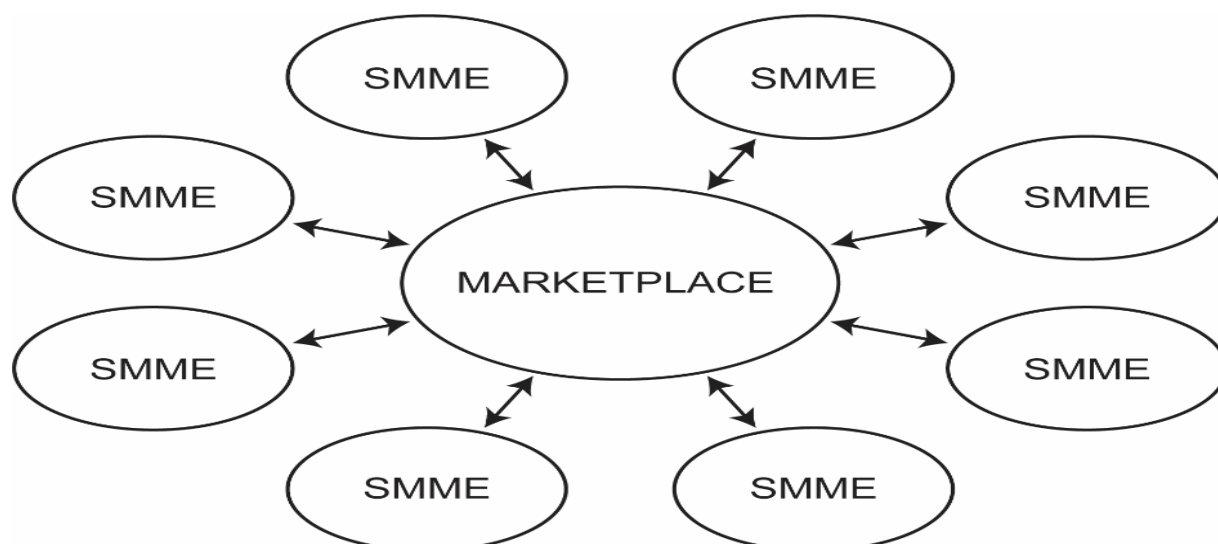


Figure 5: Visual representation of the direct symbiotic relationship between a marketplace and its SMMEs (Researcher’s own compilation, 2022).

Marketplaces thus provide SMME stall owners with the autonomy to set their own operating schedules and determine the products and services they offer (Varnai, 2018). Informal marketplaces, however, have received inadequate research attention and are characterized as groups of SMMEs operating in makeshift infrastructures with minimal government support, often without tax obligations, and focused on profit generation from local community sales (Petrovic, Ledesma, Morales, Radovanovic & Denda, 2021: 2). Table 1 illustrates the characteristics of informal marketplaces.

Table 1: Characteristics of informal marketplaces

Characteristics of informal marketplaces	Supporting authors
Typically operate in weak, temporary built infrastructures such as tents and gazebos which lack safe storage spaces for products.	Ha (2014)
Often lack electricity and speed-point machines to operate	Petrovic, Ledesma, Morales, Radovanovic & Denda, (2021).
Typically untidy and physically unattractive with poorly displayed signage and product prices that are often handwritten on cardboard boxes	Guiot & Roux, (2010);
Often physically congested as there is no clear setup for stalls in these marketplaces	Ha (2014)
Are considered hotspots for crime-related activities.	Ha (2014)
Products at informal marketplaces are mostly decently set-up and displayed on stalls	Varnai (2018)

Often very busy and easily accessible via public transportation occurring anywhere in public spaces, such as on the side of the roads/pavements	Ha (2014)
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Successful marketplace enterprises are characterized by the quality of products and services, fair pricing, attractive and clean displays, efficient management of costs, and strong customer relationships all of which informal marketplaces often lack, impacting their economic viability (Chikulo et al., 2020: 20; Kiaka et al., 2021: 14)

Informal SMMEs and marketplaces in the South African and Johannesburg context

South Africa, situated at the southern tip of the African continent, boasts the second-largest economy on the continent after Nigeria, categorizing it as an upper middle-income country (International Labour Organisation (ILO), 2018). However, despite its economic strength, the country faced a joblessness rate of 32.5% in mid-2023, with a population exceeding 60 million (Worldometer, 2023). This scenario translates to approximately 19.69 million people living below the poverty line without income, highlighting the critical role of informal SMMEs and marketplaces. South Africa is recognized as one of the most unequal societies globally, with a Gini coefficient as high as 63.4 in 2022 (World Bank, 2022). Many informal SMMEs and marketplaces in South Africa operate within the informal sector, often referred to as the 'grey' or 'shadow' economy. This sector, not formally part of the country's GDP, is marginalized and characterized by underdevelopment, a lack of skilled labor, and inadequate infrastructure (Nieuwenhuizen, 2019: 2; OECD/ILO, 2019; Wegerif, 2020: 798; Etim & Daramora, 2020: 1; Edonga, 2020: 3; Khambale, 2020: 95; ILO, 2022). Informal businesses within this sector serve as survivalist strategies, generating employment for the unemployed population (Nieuwenhuizen, 2019: 2; OECD/ILO, 2019; Wegerif, 2020: 798; Etim & Daramora, 2020: 1). However, despite their significant economic contributions, the informal sector, particularly street vending, contributes only 6%-7% to the GDP and is instrumental in creating about 22% of the country's jobs (CDE, 2021: 7; Greenberg & Meadows, 2020: 10). Research indicates that informal SMMEs have not received adequate support from the national government, reflecting broader challenges in governmental assistance for these enterprises (Nieuwenhuizen, 2019: 6; GEM, 2015-2016). Despite their significant contributions to job creation, poverty alleviation, and economic development in South Africa (Tshikhudo & Manenzhe, 2021), there remains a lack of systematic and comprehensive research documenting the diversity of operations among informal SMMEs and their various marketplaces. This gap prevents a thorough understanding of the multifaceted impacts, variables, and challenges experienced by SMME stall owners and their overall effect on the national economy (Auerswald, 2015; Vermaak, 2017). According to SEDA (2021b: 2), as of the first quarter of 2021, South Africa had approximately 1,552,814 informal SMMEs, more than double the number of formal SMMEs (667,111). Table 2 illustrates the challenges that mainly negatively affect informal SMMEs specifically in South Africa as stated by SEFA (2021/22: 18):

Table 2: challenges that mainly negatively affect informal SMMEs specifically in South Africa (SEFA, 2021/22: 18)

Main challenges negatively affecting the start-up of SMMEs	Growth challenges that negatively affect SMMEs that are already operating
Lack of start-up equipment	Labour costs and lack of proper operating equipment
Lack of guidance and knowledge, education and entrepreneurial skills and Government entrepreneurship programmes.	Lack of management knowledge on maintaining and growing a business
Government policies, tax adherence and 'red tapes'	Tax and regulatory environment compliance and adaptation to economic conditions such as recessions and inflations of products
Competition from similar businesses	Competition from larger firms and companies
Start-up capital and funding	Poor sale rates
Finding customers	Meeting and satisfying customers' needs and demands
Physical trading space to operate	Safety and security

Informal SMMEs in South Africa encounter significant challenges, with lack of capital and funding being a primary issue exacerbated by limited government support (Makwara, 2019). As of 2020, the informal sector contributed less than 6% to the country's GDP (Centre for Development and Enterprise (CDE), 2020). According

to the Small Enterprise Development Agency (SEDA) (2021: 2), SMMEs collectively generated nearly 10 million job opportunities, comprising 64% of the total labor force. However, data specifically on job creation by informal SMMEs remains scarce due to their often "invisible" status (Grain, 2020; Arias, 2019; Greenberg & Meadows, 2020), particularly in urban areas like Gauteng and Johannesburg. Informal marketplaces are prevalent in Johannesburg's CBD and surrounding areas, including townships like Soweto and Alexandra, which face high poverty and unemployment rates (Bushe, 2019; Maphela & Cloete, 2020). These areas heavily rely on informal marketplaces for economic activity (Edonga, 2020), making them key study locations.

METHODOLOGY

This multi-case qualitative study involved in-depth examination of two or more cases to understand the relationship between SMMEs sustainability and informal marketplaces. This qualitative study administered a newly created open-ended, semi-structured, interview guide (from past literature), for the interviewing of nine conveniently chosen SMME stall owners that operate at informal marketplaces around the City of Johannesburg, Gauteng, on a one-on-one basis, based on their availability. Saturation determined the sampling size of the SMME stall owners that participated in this study. As such, saturation refers to that point in research where sufficient field data has been collected due to reoccurring themes and findings (Walliman, 2006: 135). Two SMME stall owners from four informal marketplaces in the Central Business District (CBD) of Johannesburg, Soweto and Alexandra township, and one from another informal marketplace just outside of the CBD area, were chosen to participate in this study as illustrated in Table 3:

Table 3: The number of SMME stall owners from each informal marketplace that participated in this study (Source: Researcher's own compilation, 2023).

Region	Name of informal marketplace	Number of SMME stall owners chosen for interviews
Soweto	'Bara market'	Two (2)
Soweto	'Vilakazi Street art and craft market'	Two (2)
Alexandra township	'Pan market'	Two (2)
Johannesburg CBD	Noord Street Linear Market (Johannesburg CBD linear marketplace)	Two (2)
Melville, Johannesburg (outside of the CBD)	Melville Food & Farmers Market	One (1)
TOTAL NUMBER OF SMME STALL OWNERS		Nine (9)

Table 3 illustrates the nine SMME stall owners that formed part of this research study. The interview guide aimed to capture and gauge as much of the variety of perspectives as possible from the SMME stall owners about their thoughts on the role that their respective informal marketplaces play in economically sustaining the SMMEs that they operate.. Table 4 illustrates authors who formed part of the development of the newly created interview guide.

Table 4: Supporting Authors who guided the development of the newly created interview guide:

SMME stall owners interview schedule questions	Theory-authors underpinning the question (inclusive of authors from probing questions on each main question)
Demographics	Varnai, (2018); WIEGO, (2022).
About the customers	Tesic (2020)
About the products	Ha, (2014: 5); Petrovic, Ledesma, Morales, Radovanovic & Denda (2021: 2).
About the business	Ha (2014);

For consistency, the same interview guide was used for all interviews, which were recorded and transcribed word-for-word. Thematic analysis was used to analyse the field data, where common findings and information was identified, gathered and grouped into similar categories (Xu & Zammit, 2020: 1).

FINDINGS AND DISCUSSION

The following section analyses and discusses the demographical information of the SMME stall owners that operate in informal marketplaces, the type of products they sell, the type of customers who buy from informal marketplaces, and the business, operational, and legislative environment that informal SMME stall owners operate in.

Demographics of the informal SMME stall owners that operate in marketplaces in Johannesburg

The average age of informal SMME stall owners in Johannesburg's informal marketplaces is 42 years, aligning with SEDA's (2021: 22) findings that SMME stall owners in South African marketplaces typically fall within the 40-49 age range. This study specifically identified five female and four male SMME stall owners operating in Johannesburg's informal marketplaces, indicating nearly equal gender representation. The primary factors influencing the choice of location for these informal SMME stall owners include the busyness of the area, cited by 55.6% of respondents, and proximity to their homes, noted by 22.2%. Operating close to home reduces transportation costs and the burden of carrying goods daily to and from the marketplace. Many SMMEs operate in public spaces like roadsides, pavements, open fields, taxi ranks, and near malls and hospitals, maximizing revenue potential, consistent with Grain (2020)'s observations on the utilization of public spaces for income generation. Approximately two-thirds (66.7%) of SMME stall owners operate daily, from early morning until late evening, while a third (33.3%) operate exclusively on weekends, the busiest times for informal market businesses. This flexibility in operating hours allows stall owners to adjust to market demand, as highlighted by Varnai (2018). However, adverse weather conditions such as heavy rain and extreme heat, exacerbated by inadequate infrastructure, often force stall closures prematurely—a common challenge noted by Ha (2014). The average SMME stall owner in Johannesburg's informal marketplaces has been operating for 13 years, underscoring their reliance on these businesses as their primary source of income to support themselves and their families. A significant majority (55.6%) of these stall owners do not have any other sources of income besides their marketplace revenues. This finding reinforces assertions by Bushe (2019) and WIEGO (2022) that informal sectors, especially marketplace vending, play a crucial role in providing income opportunities for unemployed entrepreneurs. SEDA's (2021: 22) study indicated that 26% of SMMEs in South Africa have been operating for 6-10 years, highlighting their longevity. This study contributes further by revealing that SMME stall owners in Johannesburg's informal marketplaces have generally operated for longer durations compared to the national average. Additionally, more than half (55.6%) of the SMME stall owners studied are the sole family members operating such businesses in their households, consistent with SEDA's (2021: 24) findings that 80% of SMME owners in the informal sector are sole operators. All SMME stall owners in this study own their stalls, typically homemade and often in poor condition, consisting of makeshift structures like tables and tents secured with ropes and bricks. These findings also align with SEDA's (2021: 24) observation that about two-thirds (66.8%) of SMMEs operate within the informal sector, including informal marketplaces.

Products mainly sold by SMME stall owners at informal marketplaces

SMME stall owners in Johannesburg's informal marketplaces sell a diverse array of products including perishable and non-perishable items, accessories, household cleaning products, and clothing. A significant majority (77.8%) stock products highly demanded by their customers, supporting findings that a greater product variety boosts customer visits and sales (Petrovic et al., 2021: 2). Most SMME stall owners (88.9%) purchase their stock in bulk using physical cash from wholesale shops, primarily located in the city's CBD. Approximately 77.8% typically restock based on demand, especially for perishable goods, which require constant turnover to maintain freshness. The temporary nature of their stalls exposes products to weather elements like sun, rain, and dust, reinforcing the need for bulk purchases. Regarding suppliers, less than half (44.4%) of stall owners have an average of three suppliers, and two-thirds (66.7%) personally travel to suppliers rather than opting for delivery. They often communicate orders via phone calls (33.3%) and use public transportation like taxis (55.6%) to reach suppliers, incurring costs that impact profits. Some (33.3%) even hire private vehicles for procurement. For storage, about two-thirds (66.7%) rent facilities near their marketplaces, paying weekly fees averaging ZAR 20 to monthly fees ranging from ZAR 200 to ZAR 450. Storage safety remains a concern due to weather damage and theft. Alternatively, a third (33.3%) store goods at home if residing close to the market. When pricing products, nearly a quarter (22.2%) consider stocking and transportation costs alongside potential profits. Customer preference heavily influences product selection, while competition among stall owners within the same marketplace has minimal impact (77.8%), fostering supportive relationships among vendors.

Customers that shop at informal marketplaces

The study on informal SMME stall owners operating in Johannesburg's informal marketplaces reveals several significant insights into their operations, challenges, and strategies:

1. **Customer Base and Loyalty:** Approximately two-thirds (66.7%) of SMME stall owners primarily serve local community residents, while a third (33.3%) also cater to tourists. Customer loyalty is maintained through consistent discounts, primarily for loyal customers. This emphasizes the importance of customer satisfaction and relationships in sustaining business operations (Testic, 2020; Matz, 2021). The findings also support Sangkaew and Zhu (2020) that the tourism industry also plays an important role in the SMME sector.
2. **Cash Economy and Transactions:** Informal marketplaces predominantly operate in a cash economy, lacking electronic payment options due to limited infrastructure like speed-point machines and electricity. This aligns with the findings that such marketplaces rely heavily on physical cash transactions (Ha, 2014: 5).
3. **Advertising and Promotion:** Physical presence at stalls serves as the primary advertising strategy with minimal online presence, as revealed by more than two-thirds (77.8%) of SMME stall owners. Only a few SMME stall owners utilize social media platforms like WhatsApp™ and Facebook™ for business communication rather than formal advertising. This underscores the informal nature of marketplace advertising strategies (Ha, 2014: 12).
4. **Stall Setup and Visibility:** The physical appearance and strategic placement of stalls significantly impact customer attraction as revealed by more than two-thirds (77.8%) of the SMME stall owners. Attractive, well-set-up stalls positioned strategically among others enhance visibility and customer engagement, aligning with the concept of marketplace dynamics and customer behavior (Ha, 2014: 5).
5. **Challenges:** The main challenges faced by SMME stall owners include inadequate infrastructure (electricity, storage, etc.), bureaucratic issues (lack of documentation leading to police harassment), and vulnerability to weather conditions (Kiaka et al., 2021). However, security concerns are managed internally within the marketplace community, reflecting a cooperative approach to safety (Bushe, 2019; Apfel & Herbes, 2021). More than half (55.6%) of the SMME stall owners further revealed that receiving more products to sell and getting better infrastructure would effectively improve the success and economic sustainability of their SMMEs.
6. **Technology and Communication:** A notable portion (71.4%) of stall owners use social media platforms for customer communication, primarily WhatsApp™, Facebook™, and Instagram™. Group chats on WhatsApp™ facilitate collective communication among stall owners, fostering a supportive entrepreneurial network within the marketplace (Spigel, 2017: 65; Ogujiuba et al., 2020: 9). The integration of technology in Johannesburg marketplaces may be very useful to their development and economic sustainability considering that as of January 2023, there were more than 43.48 million active internet users, and about 25.8 social media users in the country (Statista, 2023).

The business, operational, and legislative environment that informal SMME stall owners operate in

The study on informal SMME stall owners in Johannesburg's marketplaces provides comprehensive insights into their operations, challenges, and societal impacts:

1. **Employment and Independence:** All SMME stall owners in the study are self-employed, aligning with the majority nature of SMMEs in the informal sector as reported by SEDA (2021: 24). About a third (33.3%) of female stall owners receive occasional assistance from siblings, reflecting the flexibility in employment typical of SMMEs (Adisa et al., 2014).
2. **Enterprise Classification:** According to the South African definition, the SMMEs in this study are micro-enterprises, employing between 1 and 5 individuals per stall. This classification underscores their significant role in local employment, consistent with global trends highlighted by Muriithi (2017).
3. **Training and Support:** A notable finding is that over three-quarters (77.8%) of SMME stall owners have not received formal training or support from government or organizations. This gap is attributed to the informal and often undocumented nature of the marketplaces, hindering outreach efforts by formal support programs like the National Informal Business Upliftment Strategy (NIBUS) (Arias, 2019; WIEGO, 2022).
4. **Customer Relations and Loyalty:** SMME stall owners prioritize customer interactions to build loyalty, emphasizing qualities like patience, trust, and fairness. This customer-centric approach is essential for sustaining sales and enhancing marketplace dynamics (Petrovic et al., 2021).
5. **Community and Collaboration:** Healthy relationships and teamwork among stall owners are prevalent in informal marketplaces. They support each other with tasks like providing change, safeguarding stalls, and even selling on behalf of absent colleagues. This communal support fosters a cooperative environment that benefits all stakeholders (Stam, 2015; Grigore & Dragan, 2020).
6. **Informal Market Dynamics:** Informal marketplaces operate under "unspoken laws" established by elected committees of long-standing stall owners. These internal rules govern aspects like trading space allocation, maintaining order without formal marketplace owners or managers (Ha, 2014).

7. Legal and Regulatory Challenges: Stall owners face external legal requirements, such as avoiding obstruction of roads and shop entrances. Despite the necessity for operating licenses, enforcement is lax, leading to occasional harassment by authorities seeking bribes or confiscations. This regulatory environment impacts the operational stability of SMMEs (SEFA, 2021/22).

8. Socio-economic Importance: Stall owners perceive informal marketplaces as crucial for both the surrounding community and their own economic sustainability. They provide accessible goods at reasonable prices, serving as essential economic nodes that support livelihoods and local economies (Petrovic et al., 2021).

CONCLUSION

The study emphasizes how informal marketplaces serve as vital sources of employment for the unemployed, offering opportunities to operate as sole proprietors close to their residences. Despite the lack of formal management, these marketplaces play a crucial role in providing essential goods and services to local communities. The exploratory nature of this research suggests avenues for future studies on informal SMMEs and market dynamics, providing insights that could inform government and organizational strategies aimed at supporting these enterprises and enhancing their economic sustainability. This study also identified several reasons why SMME stall owners prefer operating in informal marketplaces in Johannesburg. Despite their economic importance, informal marketplaces in Johannesburg lack formal recognition and support from national government and organizations, posing a barrier to SMME development and sustainability. Geographically, these marketplaces are concentrated in the southern and western regions of the city, including high-unemployment areas like Soweto and Alexandra, as well as the bustling CBD. Overall, the study underscores the underexplored potential of informal marketplaces in economically sustaining SMMEs, both locally and internationally. It emphasizes the need for further research to fully understand their economic contributions and inform policies that can enhance their sustainability and integration into the formal economy.

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REPOSITIONING OF THE V4 ECONOMY - AND SLOVAKIA'S WEAKENING POSITION IN IT

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Abstract:

The Visegrad Four (V4) grouping was, and still is to some extent, perceived among the Central and Eastern European (CEE) countries as a kind of pattern. But the V4's position is changing: it is no longer the case that the V4 and Slovenia are the leading performers among the CEE countries (with the other CEE countries following by a wide distance). The peloton has shuffled. And with the V4's shine diminishing, one country - Slovakia - is falling behind. The V4 countries are complicit in the loss of glamour: they have slackened in creating an attractive business environment and in developing competitiveness. The traditional advantage of a sound wage/productivity ratio is drying up, energy for businesses is expensive here (and energy intensity is high), the V4's position in the IMD World Competitiveness Rankings has suffered significantly. This raises the question of the V4's next economic agenda. A common updated V4 strategic agenda could be to overcome the trap in which its members are stuck halfway in catching up to the EU level: it takes a lot of cooperation in innovation, infrastructure or technology issues. Our paper wants to add to this debate.

INTRODUCTION

Why this kind of view? We will show that even a former leader in economic growth, such as Slovakia, can quite quickly fall into the position of a lagging economy. And that the V4, as an elite group of former CEE transition countries, is hitting a barrier and losing its unified drive. The aim is to propose and justify a new agenda for the V4 grouping. The problem presented here should be perceived by economists and policy makers across CEE countries for the sake of preventing a similar break in development.

Motivation was brought by a problem from real development. Over the last more than a decade, the differentiation of Central and Eastern European economies and the picture of their real convergence with advanced economies has changed. The original traditional picture, in which the V4 group plus Slovenia was at the top of the CEE economies, followed by the other CEE countries by a considerable gap, is gone. Since the early 1990s, the V4 group has played the role of an elite group within CEE. In recent years, the V4 has struggled to find a common agenda. In this paper we propose to strengthen and broaden its economic agenda. We do not see the fact that other CEEs are catching up with the former V4 elite as a problem. We see as a problem the fact that the catching up to advanced economies has slowed down, and more importantly, that this slowdown is most pronounced in the Slovak Republic. The problem is presented here from the point of view of Slovakia, whose development is out of step with the others in the group.

AN INSIGHT INTO LITERATURE

In papers such as Vukov (2023), Gyorffy (2022) or Slacik (2024) we find arguments that a new type of differentiation is manifesting itself in the group of CEE economies in the aftermath of the global financial crisis. Gyorffy (2022) finds that the CEE countries grouped into two clusters during this period according to how their growth model changes. The Czech Republic, Slovenia or Estonia are representatives of a move towards a new growth model based on knowledge intensity and high quality; the others continue with a growth and convergence model based on a low-cost advantage (but this advantage is fading in many cases). The case of Slovakia is unique in this categorization: as an outlier example of a CEE country with a near absence of real convergence.

A number of papers have appeared that, using modifications of the growth accounting method, have analyzed the causes of the catch-up problems with advanced economies. Such approaches help to identify the role of capital accumulation, labor and the role of the productivity of these factors of production in accelerating or decelerating growth and real convergence. A common feature of such analyses, such as Lábaj (2007), Zuk et al. (2018), Slacik 2024, is the identification of total factor productivity (TFP) as both the main factor of acceleration (before the global financial crisis) but also the main factor of deceleration (in the last more than a decade). Another reason analyzed is the insufficient accumulation of capital (or its inappropriate structure and quality) and the resulting gap in capital deepening (capital per worker) compared to advanced economies (Konya, 2023 or Pokrivcak and Zahorsky, 2016). However, the current literature considers the loss of TFP dynamics to be a crucial cause. Its dynamism has suffered in both advanced countries and CEE, and TFP transmission to CEE from more advanced economies has also been limited (Cekmeova, 2016 or Radicic et al., 2022). As the channel of transmission of

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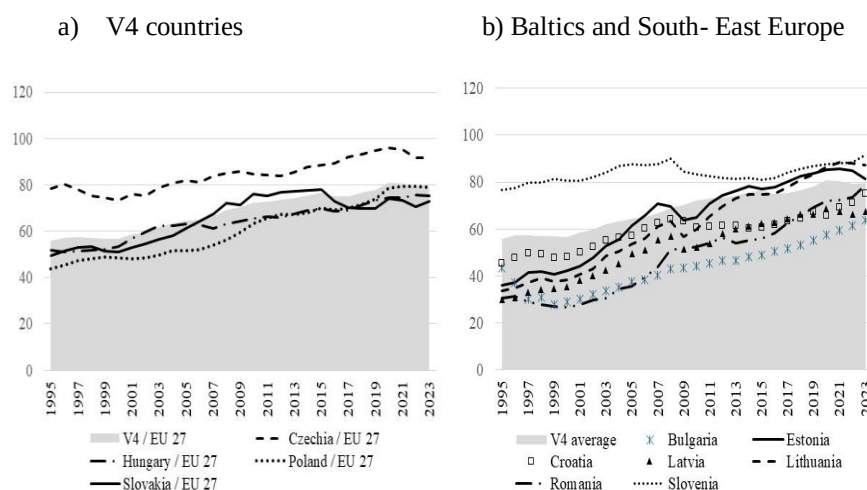
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productivity dynamics from the external environment has weakened, the emphasis on its domestic factors must be all the greater. These are very heterogeneous and difficult to measure - ranging from R&D spending to the quality of the business environment and the regulatory framework of the economy.

TWO STAGES OF THE PROBLEM

The V4 (The Visegrad Four = Czechia + Poland + Slovakia + Hungary) is not an alternative to the EU (nor did it want to be). It is a grouping of neighboring countries in Central Europe which, since the early 1990s, have wanted to help each other in social transformation, in the reform process and in integration into European structures. It is still a cooperating entity, but, as we will show below, with a lack of a clear common motive. Naturally, however, it is a benchmark of some kind. It is a group of countries with very similar economic performance, similar structural problems, similar past path of transformation, similar patterns of thinking, cultural similarity, similar informal rules. This encourages comparisons within the V4 group. However, as the V4 also represented a group of CEE economies that were at the cutting edge of the reform process, transformation and integration, the V4 also became a certain pattern for the other CEE countries and an object for comparison. As recently as 2019, *Deutsche Welle* German media described the V4 group as an “economic powerhouse in the heart of Europe”, although the problems of catching up with the top economies were already evident at the time. But nowadays it is no longer the case that the CEE group is led by the V4 plus Slovenia, with the other CEE countries standing at a great distance. The CEE peloton has been shuffled (Figure 1a,b2).

Figure 1: Relative economic performance level of CEE economies
(GDP per capita in purchasing power standards, relative to the EU27 average in %)



Source: Eurostat and own calculations.

We observe here 2 stages of the problem of changing the position of the V4 countries and Slovakia:

- Stage 1: The entire V4 loses part of its “elite”- status in the CEE.
- Stage 2: Slovakia's position in the V4 weakens.

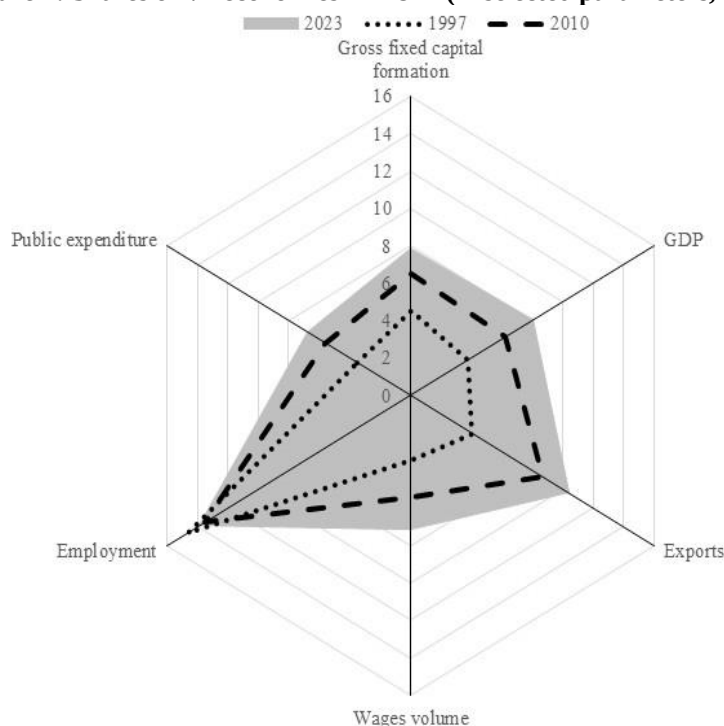
The scales on the axes of Figures 1a and 1b are set in the same way to make it easy to observe the process of convergence of the levels of the CEE countries towards each other, but also their convergence towards the EU average. Thus, the higher starting level of the V4 stands out well when compared within the CEE in the 1990s (only Slovenia is an exception). Although the V4 group in Figure 1a has a higher starting level, there is also a problem visible in the right half of the graph: after the global financial crisis and recession (2009), the catch-up curve to the EU average is too flat, the catch-up is significantly slowed down. While this slowdown was only slight in the Czech Republic and Poland, it is more pronounced in Hungary and especially in Slovakia. In Slovakia, it is even the absence of catching-up in the last decade.

In the second group (1b, non-V4 countries), the pattern was different: although the catching-up process was disrupted in several countries in the aftermath of the global financial crisis (e.g. only briefly in Estonia, longer in Croatia), the catching-up process resumed in most cases after the interruption (the slope of the curves is strikingly different than in the V4). And in the final observation period (2023), the level of these countries has not only significantly approached the V4 level, but in some cases has even surpassed it (for example, Croatia has reached the V4 average, Estonia and Lithuania have surpassed it). And Slovakia has made the most significant slowdown maneuver: after significant successes in real convergence, especially in the period 2001-2008 (when it was

outperformed in economic level only by the Czech Republic and Slovenia), it has fallen to the lower positions of the rankings. And what is worse, it has not caught up with the EU average. To mitigate the problem, objections can be raised to the calculation of purchasing power parity, in which GDP per capita is compared. Analyses such as Dujava and Žúdel (2023) or Hlavac (2023) show that distortions in the parity have arisen and that the development in the Slovak Republic would not be so unfavorable (but even after correcting the data the problem does not disappear, it is only mitigated). Even when parity is omitted from the GDP per capita comparison, the essence of the problem is preserved (Morvay et al., 2024).

For a more detailed assessment of the position of the V4 group and Slovakia in particular, the indicators are chosen to be heterogeneous and not to be affected by the calculation of purchasing power parity (due to the above mentioned concerns about parity). The V4's share in the EU economy has grown continuously (except for the almost constant share in employment). For example, the volume of wages paid in the V4 was only about 3.4% of the volume of wages paid in the EU in 1997, by 2023 it was already 7.2% - these comparisons are in Figure 2.

Figure 2: Shares of V4 economies in EU27 (in selected parameters, % of EU27)



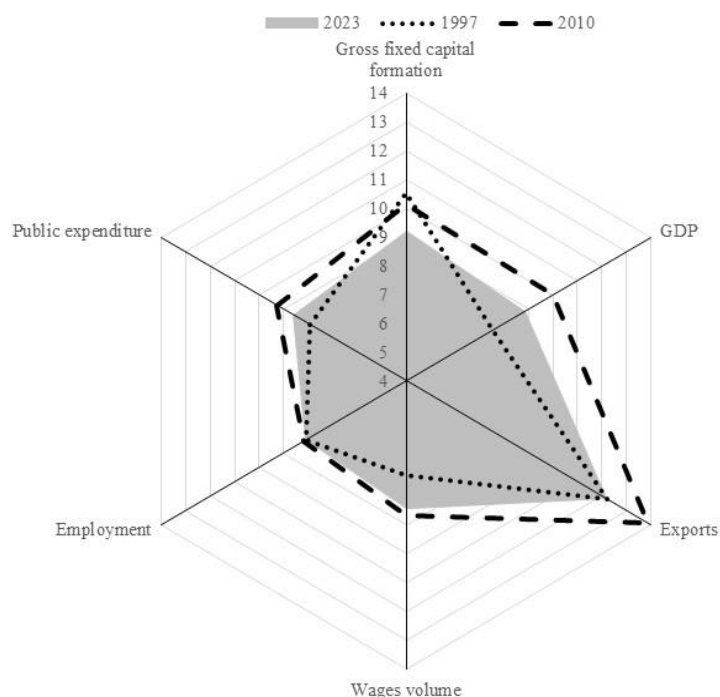
Note: Calculated from values in current prices (except for employment- calculated from number of employed persons).

Source: Own calculations based on Eurostat data.

If we use the same measures to assess Slovakia's position in the V4, we find two distinct stages (Figure 3). In the first stage, Slovakia's position improved, with the share of Slovakia in the V4 increasing significantly between 1997 and 2010. At that time, Slovakia was also successful in catching up with the EU average (as we have seen in Figure 1a). Subsequently, however, there is a reverse movement. Between 2010-2023, Slovakia's weight in the V4 economy declined. In the same period, the real convergence in Figure 1a also broke down.

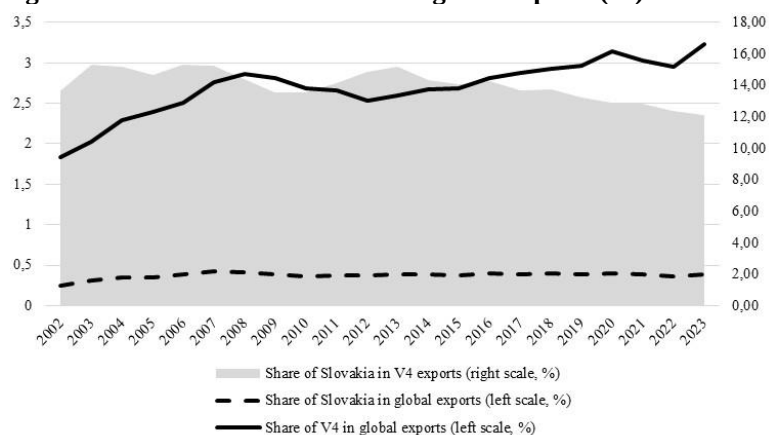
An alternative way of assessing can be to examine global export shares. All V4 countries are strongly export-oriented and export-dependent. V4 shares of global exports have been growing over the long term. But Slovakia's share in global exports reached its peak already in 2007/2008, since then Slovakia's weight in world export markets has not been growing. This is indicative of the drying up of competitiveness factors, but also of the weakening of growth incentives flowing into the Slovak economy through global chains.

Figure 3: Shares of Slovakia in V4 (in selected parameters, % of V4)



*Note: Calculated from values in current prices (except for employment- calculated from number of employed persons).
Source: Own calculations based on Eurostat data.*

Figure 4: V4 and Slovakia's shares of global exports (%)



Source: own calculations based on Eurostat data

Preliminary conclusion:

While the V4 as a whole is continuously strengthening its position in the EU economy, Slovakia is losing its position in the V4. Also, the V4 as a whole continues its real convergence with the EU average, although it has lost some of its elite position in the CEE group. Slovakia is more severely affected by the weakening of its position: Not only has it lost its position in the CEE group, but it has also lost the ability to achieve real convergence with the most advanced EU economies.

On the one hand, the V4's loss of glamour is natural, the principle of the advantage of the weaker applies. According to this principle, CEE countries with a lower initial base had the opportunity to grow faster. The

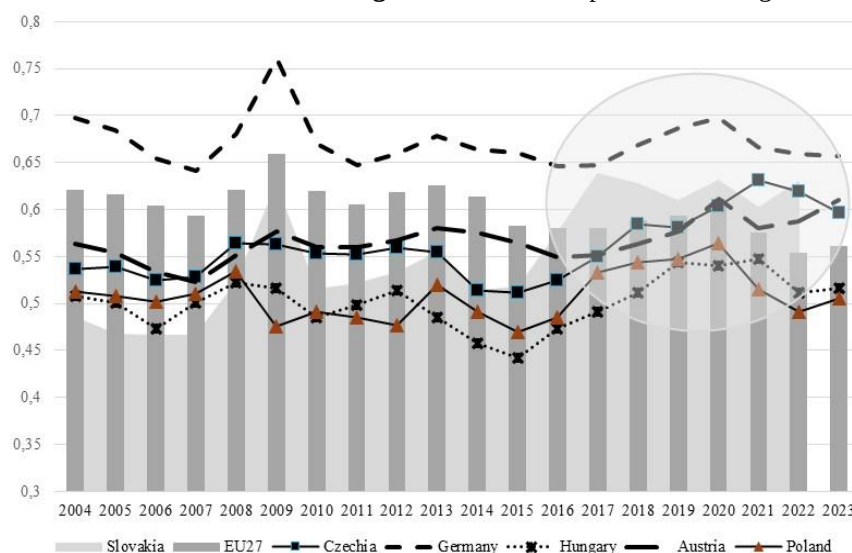
challenge for the V4 is not to keep its distance from other CEE countries, the challenge is to catch up with the most advanced countries.

But the V4 countries are complicit in the loss of their position: they have slackened in creating an attractive business environment and in developing competitiveness. And Slovakia is the most striking case of this phenomenon. The traditional advantages that underpinned Slovakia's growth and competitiveness for more than two decades have been exhausted. Typical representatives of such traditional advantages are low costs. We present the problem by looking at unit labor costs and energy costs. Low unit labor costs (i.e. a favorable labor cost/labor productivity ratio) have been the basis of Slovakia's competitiveness. However, they have largely disappeared in the last decade. Scarcity and labour shortages have pushed up wages and productivity growth has been weak - as a result, this advantage has been lost (Figure 5).

Another dimension of the problem is energy costs. The whole of the V4 (but Slovakia in particular) is affected by the problem of high energy intensity combined with high energy prices (Figure 6). The solution could be a simultaneous decline in Slovakia's position on both axes in Figure 6, which would mean a simultaneous reduction in both energy intensity and energy prices. However, such a move is not fully within the power of the Slovak economy (domestic economic policy only partly influences prices, rather it could support a further decline in energy intensity).

Figure 5: Competitiveness constraints I.

Unit labor costs in manufacturing - a traditional competitive advantage

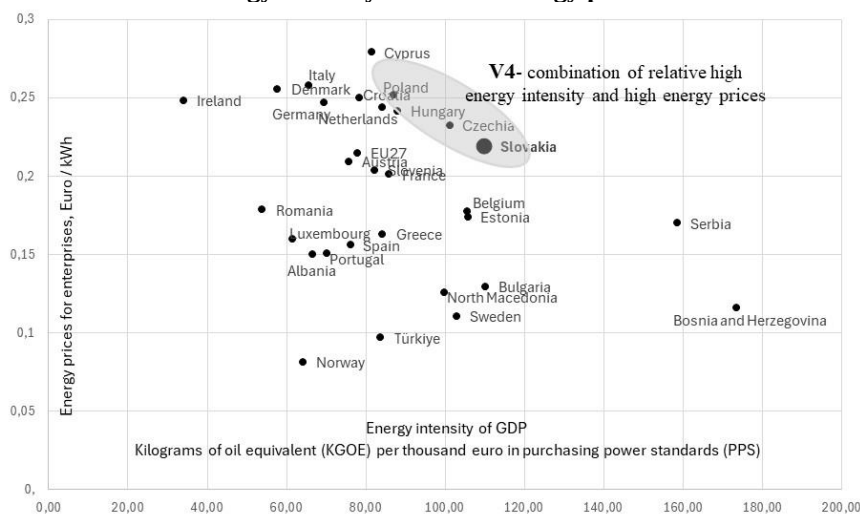


Note: The period shown is since the V4 joined the EU. Unit labor costs are expressed as a ratio of average labor costs to productivity.

Source: own calculations based on Eurostat data

Figure 6: Competitiveness constraints II.

Combinations of energy intensity levels and energy prices



Source: Own elaboration based on Eurostat data

We observe that the competitive advantage of low costs is drying up. And, as the literature demonstrates, the new drivers of productivity (TFP) are underdeveloped and constitute a major barrier to growth and real convergence (manifestations are, for example, weak corporate R&D, innovation, lagging digital transformation, deterioration of the regulatory environment, as well as a fall in competitiveness rankings such as the IMD World Competitiveness Ranking). Growth drivers are thus limited across a broad spectrum.

FOUR = TWO PAIRS WITHOUT A COMMON MOVE?

We are shifting here to the policy-making dimension. If the common problem of the V4 (and Slovakia in particular) is a deficit in total factor productivity, there is room for a common V4 agenda (respecting EU rules, of course). The V4 economic agenda has been undersized and it seems that joint challenges and efforts are already hard to find. The cooperation within the V4, although politically declared, is undersized in practice.

The V4 has repeatedly been divided into “two and two”, although the composition of the pairs is changing. Such fragmentation is related to the orientation of the ruling parties, their approach to economic strategy and, currently, their foreign policy orientation. The fragmentation of the V4 contributes to the weaker outcome of the grouping. A common “updated” V4 strategic agenda could be to overcome the trap in which its members are stuck halfway in catching up to the EU level.

Restoring TFP growth requires broadly diverse policies (as TFP itself is affected by a wide range of influences) and significant spillover effects, making it an ideal space for joint efforts. It takes a lot of cooperation in innovation, infrastructure, technology, research and development.... the ideal agenda for cooperation of the too small but ambitious.

CONCLUSION

We have shown how a group of economies, initially at the forefront of the performance of CEE economies, is being caught up by others. And how the representative of the former elite group, Slovakia, is affected by the interruption of its real convergence with the advanced economies. It is an exposition of how the development of a CEE economy can be complicated when its original growth factors are exhausted and the creation of new ones neglected. This may be a scenario worthy of recognition across the entire set of CEE countries. The emphasis on restoring TFP growth gives room for joint efforts within CEE- it can be a common agenda of different cooperation platforms such as the V4 or even the WB6.

ACKNOWLEDGEMENT: Supported by grant No. VEGA 2/0042/23” of the “VEGA Scientific Grant Agency”

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PROMISES, PERCEPTIONS, AND DEPARTURES: A QUANTITATIVE EXPLORATION OF PSYCHOLOGICAL CONTRACTS AND TURNOVER INTENTIONS AMONG SOUTH AFRICA'S JUNIOR LEADERS

Lia Martha Maria Hewitt¹ and X. Mgebe²

Abstract:

This study explores how psychological contracts influence the relationship between job satisfaction and turnover intentions among junior leaders in South Africa. A cross-sectional quantitative design was adopted. Primary data was obtained via a self-administrated e-survey from 89 junior leaders and data were analysed using descriptive statistics, exploratory factor analysis, correlational analysis, and moderation testing via the PROCESS macro. Findings reveal a significant negative relationship between job satisfaction and turnover intentions, confirming that higher satisfaction is associated with lower intent to leave. Breaches in psychological contracts, particularly in the areas of compensation, flexibility, and career advancement, were found to be strongly associated with increased turnover intentions. These breaches did not directly moderate the relationship between job satisfaction and turnover intentions, but they significantly intensified withdrawal cognitions when perceived expectations were unmet, highlighting their broader influence on retention dynamics. The study underscores the importance of managing employee expectations through transparent communication, equitable reward structures, and clear developmental pathways, offering culturally situated insights for improving organisational stability and leadership continuity in the South African context.

Keywords: Psychological Contract; Job Satisfaction; Turnover Intentions; Junior Leaders; Employee Retention

INTRODUCTION

Psychological contracts have garnered increasing interest, and their importance has been acknowledged in influencing the employee-employer relationship. According to Bal et al. (2008), these contracts are typically categorised into two types: relational and transactional. Relational contracts focus on trust, loyalty, and long-term commitment between parties while transactional one's center around specific tasks with an emphasis on short-term rewards like financial compensation. Understanding these distinctions helps align employee expectations with organisational goals. Junior leaders are especially vulnerable to violations of psychological contracts because they function as both subordinates and managers. These breaches can result in lower job satisfaction and higher turnover intentions, subsequently impacting team morale and organisational performance (Hina Topa et al., 2022; Ivana et al., 2025). In South Africa, breaches in these psychological contracts bear particular significance due to socio-economic challenges and changing workforce demographics that increase the likelihood of employee dissatisfaction and attrition (Nkosi, 2023; Van der Vaart & De Beer, 2023). This is because South Africa remains one of the most unequal societies in the world (World Bank, 2022). Many employees come from economically disadvantaged backgrounds and view employment not merely as a means of income, but as a pathway to stability, dignity, and upward mobility. A psychological contract breach, for example, the failure to provide promised career development, fair remuneration, or respectful treatment, can be perceived as a violation of these deeply held expectations, leading to heightened emotional and motivational consequences (Rousseau, 1995). Therefor it is argued that leaders who address employees' concerns and align organisational actions with their expectations can greatly diminish turnover intentions and enhance organisational stability.

Despite the extensive global research on psychological contracts, their impact in the South African context particularly among junior leaders has not been thoroughly explored. This study seeks to fill this gap by providing practical insights for human resource practitioners, aiming to enhance employee retention and satisfaction in South African organisations.

PROBLEM STATEMENT

Psychological contracts, informal and often unspoken expectations between employees and employers, play a crucial role in shaping job satisfaction and turnover intentions (Mehta et al., 2022; Rousseau, 1989). These contracts represent mutual perceptions of obligations that may arise from formal agreements or implicit expectations embedded in organisational culture.

Research consistently affirms that breaches in these contracts negatively impact employee attitudes and retention. Studies by Rousseau and Greller (1994), Tekleab and Taylor (2003), highlight strong associations between fulfilled

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psychological contracts and increased job satisfaction, while unmet expectations are linked to heightened turnover intentions (Wang et al., 2023; Umar & Ringim, 2015). High attrition not only imposes direct staffing costs but also disrupts productivity and morale, posing long-term risks to organisational sustainability.

The COVID-19 pandemic has further altered employer–employee dynamics, prompting new workplace arrangements and shifting expectations (Vyas, 2022). In this evolving context, the psychological contract has become increasingly salient in guiding employee commitment and behaviour.

Despite extensive scholarship, the precise nature of the interplay between psychological contract, job satisfaction, and turnover intention remains contested (Bal et al., 2018). Particularly, the moderating role of psychological contract fulfilment within this triadic relationship is underexplored. This gap is more pronounced in the South African context, where socio-cultural and economic factors may differently shape these dynamics. Accordingly, this study seeks to extend existing knowledge by investigating the moderating influence of psychological contract fulfilment on the link between job satisfaction and employee turnover intentions within South Africa's unique post-pandemic work environment.

LITERATURE REVIEW

This paper adopts a multidisciplinary theoretical framework to explore the complex relationships among psychological contracts, job satisfaction, and employee turnover intentions. At its core, the analysis is grounded in Maslow's Hierarchy of Needs, Social Exchange Theory, and Equity Theory, which collectively emphasise the role of need fulfilment, perceived fairness, and reciprocal exchanges in shaping employee attitudes and behaviours. To deepen the conceptual foundation, the study integrates additional perspectives. Herzberg's Two-Factor Theory distinguishes between hygiene factors and intrinsic motivators in job satisfaction, while Job Embeddedness Theory introduces the influence of organisational and community ties in employee retention. Expectancy Theory highlights the alignment between employee effort and anticipated rewards, and Organisational Support Theory underscores the importance of perceived support in sustaining psychological contract fulfilment.

Together, these frameworks offer an integrated lens for understanding retention dynamics and guiding human resource strategies, particularly in the nuanced South African work context.

In advancing this conceptual model, the study further interrogates each of the three central constructs. Employee turnover intention is widely regarded as a key antecedent of actual turnover behaviour (Hom & Griffeth, 1995; Holland & Tzafrir, 2013). Defined as the deliberate and conscious desire to leave a current role or employer (Wang et al., 2023) turnover intention is now more precisely understood to operate at both job-specific and organisational levels, with employees potentially disengaging from a role while maintaining commitment to the organisation as a whole (Sartori et al., 2023).

This refined theoretical approach provides the basis for examining how psychological contract perceptions and job satisfaction interact to influence turnover intentions, thereby contributing to retention scholarship in an evolving South African employment landscape.

Employee Turnover Intentions

This study conceptualises employee turnover intention through two key theoretical lenses: Social Exchange Theory and Equity Theory. Social Exchange Theory posits that when the psychological contract is violated, i.e., when perceived organisational rewards fail to match employee contributions, dissatisfaction ensues, often triggering withdrawal behaviours (Lee, Chaudhry & Tekleab, 2014; Lu et al., 2023). Similarly, Equity Theory asserts that perceptions of distributive or procedural injustice increase negative effect and turnover intentions, particularly when employees feel under-rewarded relative to their inputs (Jehanzeb & Bashir, 2025). Both frameworks highlight the mediating role of the psychological contract and underscore the importance of perceived fairness and reciprocity in retention dynamics.

Turnover intention is widely recognised as a multidimensional construct, encompassing both affective and cognitive evaluations of job fit and organisational alignment (Lazzari, et al., 2022; Ike et al, 2023). At the job-specific level, it reflects dissatisfaction with immediate conditions such as role ambiguity or supervisor relations, whereas at the organisational level, it is associated with broader concerns, including leadership, culture, or career progression (Holland & Tzafrir, 2013).

Empirical studies have employed validated tools such as the Turnover Intention Scale (Griffeth et al., 2000), Intention to Quit Scale (Mobley et al., 1978), and the Career Opportunities and Turnover Intentions Scale (Hom & Griffeth, 1995) to capture these dimensions, with some instruments extending to anticipated future commitment (Porter et al., 1974).

Among the most consistently cited predictors of turnover intention is job satisfaction, with dissatisfaction serving as a robust precursor to exit behaviour (Wang et al., 2023; Jiang, 2024). Other significant antecedents include perceived organisational support, which strengthens commitment and buffers against turnover, and leadership

behaviour, where fairness, empathy, and developmental support reduce withdrawal cognitions (Xie et al., 2024). Conversely, autocratic or inattentive leadership styles often erode trust and elevate attrition risks. Overall, organisations that foster a supportive and equitable climate, through aligned expectations, inclusive leadership, and developmental investment, are better equipped to reduce turnover intentions and retain critical talent.

Job satisfaction

Job satisfaction is a foundational construct in organisational psychology, reflecting an employee's emotional and cognitive evaluation of their job experience (Locke, 1976; Judge & Bono, 2020). It encompasses fulfilment, motivation, and well-being, shaped by job content, interpersonal relations, leadership, autonomy, and organisational culture. Early theories, such as Herzberg's Two-Factor Theory and the Job Characteristics Model (Herzberg et al., 1959; Hackman & Oldham, 1976), distinguished between intrinsic motivators and extrinsic hygiene factors, offering enduring insight into the sources of satisfaction.

Contemporary scholarship views job satisfaction as multidimensional and dynamic, arising from the interaction of individual expectations with workplace realities (Jiang et al., 2024). Researchers increasingly stress the integration of affective responses and cognitive evaluations in assessing satisfaction (Judge & Bono, 2020), with empirical studies linking it to organisational commitment, productivity, and lower turnover intention (Xie et al., 2024).

Aligned with motivational theories, job satisfaction is explained through several complementary frameworks:

- Maslow's Hierarchy of Needs links satisfaction to progressive need fulfilment (Pardee, 1990)
- Herzberg's Theory distinguishes between maintenance and motivational factors (Sakarji, 2021)
- Equity Theory relates satisfaction to perceptions of fairness in reward distribution (Bashir & Jehanzeb, 2019)
- Social Exchange Theory emphasises reciprocity and perceived organisational support in sustaining positive job attitudes (Chaudhry & Tekleab, 2017).

Together, these theories underscore the psychological and relational underpinnings of employee satisfaction.

Widely used instruments, such as Spector's Job Satisfaction Survey (JSS), the Minnesota Satisfaction Questionnaire (MSQ), and the Work-Life Balance Scale, capture both intrinsic and extrinsic dimensions of satisfaction, offering reliable tools for diagnosis and intervention (Judge et al., 2021; Carlson & Kacmar, 2000).

Empirical evidence consistently demonstrates that job satisfaction is a significant predictor of turnover intention (Griffeth et al., 2000). Satisfied employees, whose psychological needs for autonomy, competence, and relatedness are met, are less likely to leave their organisations (Deci & Ryan, 2000). Meta-analyses confirm this negative relationship, further mediated by factors such as perceived organisational support and fair supervisory practices (Eisenberger et al., 2002; Tepper, 2017).

Accordingly, the first sub-research objective, exploring whether job satisfaction predicts turnover intention, is addressed through the following hypothesis:

H1_o: There is no significant relationship between job satisfaction and employee turnover intention.

H1_a: There is a significant negative relationship between job satisfaction and employee turnover intention.

Psychological Contract as a Moderating Variable

The psychological contract refers to an employee's subjective beliefs about mutual obligations with the employer (Rousseau, 1989). It plays a pivotal role in shaping work attitudes, influencing both job satisfaction and turnover intention. Violations of the psychological contract, whether through unmet expectations related to flexibility, compensation, or career development, can result in decreased organisational commitment and increased intent to leave (Morrison & Robinson, 1997).

Work Flexibility: Flexibility in work arrangements has become a salient feature of the modern psychological contract. When implemented fairly, it fosters work-life balance, enhances job satisfaction, and strengthens employee commitment (Allen et al., 2013; Kossek et al., 2006). However, inconsistencies in its application may be perceived as contract breaches, especially if linked to inequitable treatment (Austin-Egole et al., 2021).

Salary Increases: Compensation remains a key determinant of perceived contract fulfilment. Fair and transparent remuneration policies can enhance satisfaction and commitment, whereas inadequate or unequal compensation is often perceived as a breach, leading to dissatisfaction and heightened turnover intentions (Cropanzano & Folger, 1991).

Career Advancement: Opportunities for growth are critical for employee engagement. When employees perceive a lack of fairness in promotion or limited access to developmental pathways, their trust in the employer may erode, affecting job satisfaction and turnover outcomes (Greenhaus et al., 1990).

Based on these considerations, the second sub-research objective, exploring the moderating role of the psychological contract, is supported by the following hypothesis:

H2_o: The psychological contract does not significantly moderate the relationship between job satisfaction and turnover intention.

H2_a: The psychological contract negatively moderates the relationship between job satisfaction and turnover intention when violated.

Psychological Contract and Job Satisfaction

Psychological contract fulfilment is positively associated with job satisfaction, while violations evoke negative emotional and cognitive responses such as frustration, mistrust, and disengagement (Conway & Briner, 2002; Morrison & Robinson, 1997). Research shows that these breaches are often stronger predictors of job dissatisfaction than objective job demands (Rayton & Yalabik, 2014).

H3_o: There is no significant relationship between the psychological contract and job satisfaction.

H3_a: There is a significant positive relationship between the psychological contract and job satisfaction.

The Psychological Contract and Turnover Intention

Violations of the psychological contract have been consistently linked to increased turnover intention. Affective responses to breached obligations, particularly when concerning fairness, support, or recognition, can diminish organisational commitment and lead employees to consider exiting the organisation (Suazo et al., 2019). Factors such as perceived employability and availability of external job alternatives further intensify this outcome (Paillé & Dufour, 2013).

H4_o: Breaches in psychological contract obligations (flexibility, salary, career advancement) do not increase turnover intention.

H4_a: Breaches in psychological contract obligations increase turnover intention.

Leadership Implications

Leadership is instrumental in shaping the psychological contract through communication, fairness, and trust-building (Guest & Conway, 2006; Robinson & Rousseau, 1994). In the post-pandemic context, employees increasingly seek alignment between personal growth and organisational values (Osterland, 2021). Leaders who prioritise transparency, offer development opportunities, and actively manage expectations can foster stronger psychological contracts, improve job satisfaction, and reduce turnover (Zhao et al., 2007). Figure 1 presents the conceptual measuring model and its associated hypotheses.

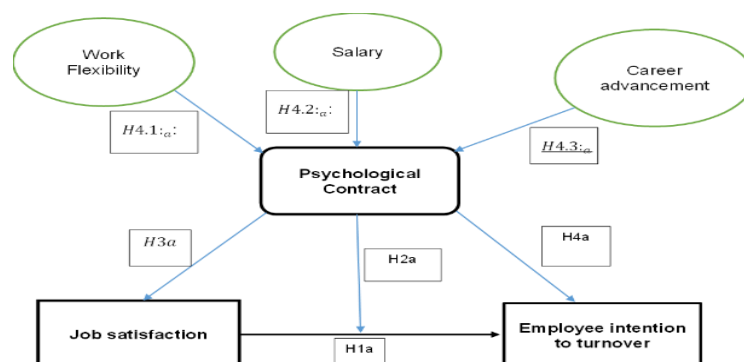


Figure 1: Conceptual measuring model

RESEARCH APPROACH

This study adopted a quantitative, cross-sectional survey design within a positivist paradigm, appropriate for testing hypothesised relationships among job satisfaction, psychological contracts, and turnover intentions. The positivist approach facilitated empirical analysis of observable phenomena, enabling statistical testing and generalisability (Creswell & Creswell, 2018). The cross-sectional design allowed for efficient data collection at a single point, suitable for exploring associations rather than causality. A structured survey enhanced response consistency and supported inferential analysis (Bryman, 2016).

To ensure the robustness of the measurement instruments, a structured web-based survey was developed and pre-tested through a pilot study involving 10 participants. Psychometric properties, including reliability and construct validity, were assessed through Cronbach's alpha and Exploratory Factor Analysis (EFA), thereby strengthening measurement integrity in this context.

Population, Sampling, and Sample Profile

The target population comprised junior leaders in Gauteng's metal and steel industry, a critical intermediary group linking strategic and operational levels. Due to population size and access limitations, a non-probability purposive sampling strategy was used, suitable for selecting information-rich cases aligned with the study's focus (Showkat & Parveen, 2017).

Out of 137 responses, 89 valid questionnaires were retained post-cleaning. This sample met recommended thresholds for exploratory analysis (Tabachnick & Fidell, 2007; 2019; Kyriazos, 2018) and ensured relevance for correlational research in constrained field conditions.

The sample was demographically diverse

62.9% were aged between 20–29 years, reflecting a younger leadership cohort. Females comprised 67.4%, consistent with patterns of increased female participation in business functions and organisational psychology studies (Bellou, 2010). The majority were African (88.8%), aligning with national demographics. Most (79.8%) had 2–9 years experience, indicating an early- to mid-career stage. 82% held tertiary qualifications, affirming suitability for leadership-focused research.

Data Collection and Instrumentation

Data were collected via a structured, web-based questionnaire aligned with the study's conceptual framework. The instrument comprised four sections:

Section A: Demographics, supporting subgroup analysis (Omori & Bassey, 2019).

Section B: Turnover Intention, using the TIS-6 (Bothma & Roodt, 2013) extended by 8 items to assess contextual triggers of exit likelihood.

Section C: Job Satisfaction, measured with the Andrew and Withey (1976) scale, validated and moderately updated based on recent scholarship (Smith & Johnson, 2020).

Section D: Psychological Contract, assessed using an adapted Freese and Schalk (2008) scale, focusing on employee perceptions of obligations such as fairness, advancement, and flexibility.

Pilot Study and Procedure

A pilot with 10 participants and expert review by statisticians informed final revisions. Controls ensured one-time participation and confidentiality. Ethical approval was granted, with informed consent obtained from all participants.

Data Analysis

Using IBM SPSS Statistics (Version 29), analyses included: Descriptive statistics to profile respondents and assess variable distributions. Exploratory Factor Analysis (EFA) using Principal Axis Factoring with oblique rotation to confirm construct validity for adapted instruments. Pearson's correlation to explore bivariate associations among the core variables. PROCESS Macro (Model 1) by Hayes (2018) tested moderation effects, assessing conditional relationships and interaction terms.

All assumptions for regression analysis, including linearity, normality, and homoscedasticity, were examined and met. Effect sizes were also reported to complement p-values, facilitating a more nuanced interpretation of the magnitude and practical relevance of the findings.

Reliability and Validity

All scales met internal consistency thresholds (Cronbach's $\alpha \geq 0.70$). The use of validated instruments and rigorous data cleaning procedures strengthened the study's reliability and analytical robustness.

FINDINGS AND DISCUSSIONS

This section presents the main findings, aligned with the study's hypotheses and contextualised within relevant theoretical frameworks. The focus is on understanding the interplay between job satisfaction, psychological contracts, and turnover intentions among junior leaders in South Africa's metal and steel industry.

Job Satisfaction and Turnover Intention

Supporting H1_a, a moderate negative correlation was found between job satisfaction and turnover intention ($r = -0.397$, $p < 0.001$). This aligns with prior research (Griffeth et al., 2000; Ersoy, 2024) and theoretical models such as the Job Characteristics Model (Hackman & Oldham, 1976) and Self-Determination Theory (Deci & Ryan, 2000), which link need fulfilment to reduced withdrawal. Even in operationally intensive roles, satisfaction, particularly from intrinsic factors like autonomy and recognition, emerged as a strong predictor of retention.

Moderating Effect of the Psychological Contract

To test H2, Hayes's PROCESS macro regression analysis (Table 1) Model summary and coefficients (Table 2) was conducted to determine whether the psychological contract moderates the relationship between job satisfaction and turnover intention. Specifically, the analysis assessed whether perceptions of psychological contract breach attenuate the protective effect of job satisfaction on employees intention to leave. The overall model was statistically significant, $F(3, 85) = 6.75$, $p < .001$, explaining approximately 19.25% of the variance in turnover intention ($R^2 = .1925$). As expected, job satisfaction emerged as a significant negative predictor of turnover intention ($\beta = -0.998$, $p = .0097$), indicating that higher satisfaction is associated with lower intention to leave.

Table 1 –Model Summary and Coefficients

Model Summary						
R	R-sq	MSE	F	df1	df2	p
.4387	.1925	.5760	6.7541	3.0000	85.0000	.0004
Model						
	coeff	se	t	p	LLCI	ULCI
constant	5.7573	1.1583	4.9707	.0000	3.4544	8.0603
EJS	-.9979	.3772	-2.6456	.0097	-1.7478	-.2479
rPC	-.2898	.6331	-.4577	.6483	-1.5485	.9690
Int_1	.1694	.1849	.9164	.3621	-.1982	.5371
Product terms key:						
Int_1	:	EJS	x	rPC		
Test(s) of highest order unconditional interaction(s):						
	R2-chng	F	df1	df2	p	
X*W	.0080	.8398	1.0000	85.0000	.3621	
***** ANALYSIS NOTES AND ERRORS *****						
Level of confidence for all confidence intervals in output:						
95.0000						

However, the interaction term between job satisfaction and psychological contract breach was not statistically significant ($\beta = 0.169$, $p = .3621$), and the change in explained variance attributable to the interaction was negligible ($\Delta R^2 = .0080$). These findings indicate that the psychological contract does not significantly moderate the relationship between job satisfaction and turnover intention. Therefore, the null hypothesis (H2_o) is retained, and the alternative hypothesis (H2_a) is not supported. This suggests that the inverse relationship between job satisfaction and turnover intention remains consistent, regardless of employees' perceptions of psychological contract breach.

Psychological Contract and Job Satisfaction

For H3_a, results revealed a strong positive correlation between psychological contract fulfilment and job satisfaction ($r = 0.716$, $p < 0.001$), consistent with prior findings (Conway & Briner, 2002; Morrison & Robinson, 1997). Social Exchange Theory (Blau, 1964) helps explain this pattern: employees who perceive organisational reciprocity respond with greater satisfaction and commitment, particularly relevant for junior leaders who manage both upward and downward organisational expectations.

Psychological Contract and Turnover Intention

H4_a examined the link between psychological contract breach and turnover intention. A weak negative correlation ($r = 0.209$, $p < 0.049$) indicates that higher levels of perceived breach are associated with greater intentions to leave. While the detailed regression findings are not discussed in depth within this paper, it is noteworthy that unmet expectations regarding flexibility ($\beta = .29$), salary ($\beta = .22$), and career advancement ($\beta = .25$) emerged as significant predictors of turnover intention in the broader model. This underscores the multidimensional nature of the psychological contract (Freese & Schalk, 2008; Zhao et al., 2020) and reflects growing post-pandemic demands for flexible, equitable workplaces (Osterland, 2021). Breaches in these areas fuel dissatisfaction, disengagement, and eventual exit (Suazo et al., 2019).

Additional Observations

Demographic analysis revealed that most respondents were aged between 20–29 (62.9%), predominantly female (67.4%), and largely of African descent (88.8%). These demographic patterns are notable in interpreting the results, particularly given generational differences in workplace expectations and gendered experiences in organisational commitment and satisfaction (Bellou, 2010). The relatively young age of the respondents suggests a cohort that values growth, adaptability, and meaningful work, elements tightly interwoven with psychological contract fulfilment.

Table 2: Hypotheses Testing Results

Hypothesis	Statement	Supported	Statistical Outcome
H1a	There is a significant negative relationship between job satisfaction and employee turnover intention.	Supported	$(r = -0.397, p < 0.001)$
H2a	The psychological contract does not moderate the relationship between job satisfaction and turnover intention.	Supported	$(\beta = -0.169, p < 0.362)$
H3a	There is a significant positive relationship between the psychological contract and job satisfaction.	Supported	$(r = 0.716, p < 0.001)$
H4a	Violation of psychological contract obligations (flexibility, salary, advancement) increases turnover intention.	Supported	$(r = 0.209, p < 0.049)$; $(\beta\text{s range} = 0.22\text{--}0.29)$

Limitations of the study

Several limitations should be considered. First, while the sample size ($n = 89$) met statistical requirements, its confinement to Gauteng-based organisations limits broader generalisability across South Africa's industrial landscape. Second, cross-sectional design restricts causal inference; longitudinal research is needed to examine how job satisfaction and psychological contract perceptions evolve over time. Third, reliance on self-reported data may introduce response bias, particularly in relation to organisational dissatisfaction. Lastly, the study's focus on junior leaders within a single sector may limit applicability to other leadership levels or industries with different organisational dynamics.

Future Research

The findings suggest several avenues for further inquiry. Longitudinal studies are needed to track how psychological contract perceptions and turnover intentions evolve over time. Expanding research across sectors, such as healthcare, finance, or public service, would enhance generalisability. Future work should also examine variation across leadership levels to uncover potential hierarchical differences in contract fulfilment and satisfaction dynamics. Additionally, incorporating identity variables such as race, gender, and tenure may offer deeper insight into moderating effects. While the current study focuses on junior leaders in the metal and steel industry, future comparative research across sectors and hierarchical levels would be beneficial to assess whether similar contract dynamics and turnover patterns persist, thus enhancing the generalisability and robustness of these empirical findings. Finally, experimental studies evaluating the impact of HR interventions, such as onboarding practices, recognition systems, or flexible work policies, are recommended to assess strategies for strengthening psychological contracts.

Contributions of the study

This study contributes to both theory and practice. Theoretically, it extends psychological contract scholarship by confirming its moderating role in the job satisfaction–turnover intention link, with novel attention to sub-

dimensions such as flexibility, compensation, and career progression, particularly relevant in the underexplored Global South context.

Practically, the findings highlight the need for HR practitioners to actively manage psychological contracts through transparent communication, equitable reward systems, and clear development pathways. These strategies are especially critical for retaining junior leaders in high-demand operational environments.

Contextually, the study addresses a notable gap in South African industrial relations literature, offering sector-specific insights into leadership retention within the metal and steel industry.

Beyond statistical significance, the observed relationships, particularly the moderating effect of psychological contract breach, offer practical insights for human resource strategy. Even high job satisfaction may not translate to retention if perceived breaches in fairness or advancement persist, underscoring the necessity for proactive psychological contract management.

CONCLUSION

This study examined the relationship between job satisfaction, psychological contracts, and turnover intentions among junior leaders in South Africa's metal and steel industry. Using a cross-sectional quantitative design, results confirmed that higher job satisfaction was significantly associated with lower turnover intentions, supporting both classic (Griffeth et al., 2000; Tett & Meyer, 1993) and recent findings (He et al., 2023; Yang et al., 2025).

Importantly, psychological contract breaches emerged as a key moderator. Employees who experienced unmet expectations, particularly around salary, flexibility, and advancement, reported lower satisfaction and stronger intentions to leave. This aligns with foundational theories (Rousseau, 1995; Morrison & Robinson, 1997) and contemporary evidence showing that perceived contract violations erode trust and commitment (Bari et al., 2022).

The PROCESS macro analysis yielded a statistically significant overall model ($p = .0004$), accounting for approximately 19.25% of the variance in turnover intention ($R^2 = .1925$). Among the predictors, employee job satisfaction (EJS) emerged as a significant negative predictor of turnover intention ($\beta = -0.998$, $p = .0097$), indicating that higher levels of satisfaction are associated with a decreased likelihood of leaving the organisation. In contrast, reversed psychological contract (rPC), representing perceptions of unmet expectations, did not significantly predict turnover intention when considered as a main effect ($\beta = -0.290$, $p = .6483$).

The interaction term between job satisfaction and psychological contract ($EJS \times rPC$) was not statistically significant ($\beta = 0.169$, $p = .362$), and the change in explained variance was minimal ($\Delta R^2 = .008$). This result suggests that perceptions of psychological contract breach do not significantly alter the strength or direction of the relationship between job satisfaction and turnover intention. In other words, the protective effect of job satisfaction against turnover intention remains consistent, regardless of whether employees perceive their psychological contract to have been fulfilled or violated.

It is noted that junior leaders, positioned at the intersection of strategic and operational roles, are particularly attuned to discrepancies between organisational promises and lived realities. Cultural expectations, hierarchical rigidity, and unmet career aspirations may further amplify perceptions of psychological contract breach within this group.

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LEADERSHIP AND ORGANISATIONAL COMMITMENT: AN INTERPRETATIVE EXPLORATION OF LEADERSHIP INFLUENCE IN A SOUTH AFRICAN INDUSTRIAL CONTEXT

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Abstract:

This paper explores the relationship between Spiritual Leadership and organisational commitment, examining how spiritual values influence employee affiliation and motivation. Drawing on interpretative phenomenological analysis, the study employed semi-structured interviews with nine senior managers from a South African mining and infrastructure equipment organisation. Key themes include value-centric leadership, ethical conduct, trust, empathy, and the integration of spirituality in the workplace. Findings suggest that Spiritual Leadership enhances organisational commitment when grounded in authenticity, trust, and belief. A theoretical model is proposed to illustrate these dynamics. While workplace spirituality shows promise, it remains an emerging field requiring further investigation into its practical application in leadership.

Keywords: Spiritual Leadership; Organisational Commitment; Trust in Leadership; Workplace Spirituality; Leadership Authenticity

INTRODUCTION

Leadership theory has evolved significantly, reflecting ongoing debates about the nature and effectiveness of leadership (Hunt & Fedynich, 2019; Samul, 2019). Despite various models, no single theory has fully captured the complexity of leadership across contexts (Dugan et al., 2021). Early theories such as the Great Man and Behavioural theories focused on inherent traits and observable behaviours, respectively (Samul, 2019). Later, Contingency Theory introduced situational adaptability, recognising the dynamic nature of leadership and its dependence on follower readiness and context.

Transformational leadership, with its emphasis on vision, influence, and motivation, has been widely adopted, particularly in addressing 21st-century organisational challenges (Northouse, 2016). However, contemporary environments increasingly demand leadership that integrates both rational and emotional dimensions, paving the way for spiritual leadership. This emerging paradigm emphasises purpose, values, and intrinsic motivation, responding to the human need for meaning in the workplace (Fry & Nisiewicz, 2013; Chen & Yang, 2012).

Spiritual leadership prioritises inner life, calling, and membership, and seeks to align individual and organisational values (Fry, 2003). It fosters a sense of community, shared vision, and ethical conduct, offering a holistic alternative to mechanistic leadership models. In the South African context, characterised by socio-economic inequalities and cultural diversity, this approach may be especially salient, as it addresses both psychological well-being and organisational cohesion.

This paper examines the relationship between spiritual leadership and organisational commitment, aiming to contribute empirical insight into how value-based leadership practices influence employee attachment and motivation within a South African organisational setting.

LITERATURE REVIEW

Many South African organisations continue to adopt transactional leadership styles, emphasising contractual obligations over deeper engagement (Makka, 2019). However, sustained performance increasingly depends on employees going beyond formal job requirements through discretionary effort (Djaelani et al., 2020). In this context, organisational commitment has become essential, representing a psychological force that aligns employees with organisational goals (Baykal, 2019).

In volatile and complex environments (VUCA), traditional notions of loyalty and long-term commitment are diminishing (Jena & Pradhan, 2018). Consequently, leadership approaches that prioritise values, trust, and meaning are gaining traction. Spiritual leadership offers such a model, fostering motivation, satisfaction, and ethical workplace cultures (Nguyen et al., 2018).

Spiritual leadership promotes an integrated perspective by attending to employees' inner lives and aligning work with personal values (Fry, 2003). Research has shown that this approach not only strengthens individual purpose but also creates supportive organisational climates where commitment can flourish. The inclusion of spirituality

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in leadership practices is thus emerging as a key driver of sustainable employee engagement and organisational success.

Organisational Commitment

Organisational commitment refers to an employee's psychological bond with their organisation, encompassing loyalty, identification, and a desire to contribute to organisational success (Fry & Nisiewicz, 2013; Asrar-ul-Haq & Anwar, 2018). It reflects the extent to which employees internalise organisational values and demonstrate a willingness to exert effort beyond formal requirements (Yahaya & Ebrahim, 2016; Kokt & Palmer, 2019).

This commitment is marked by an employee's intention to remain with the organisation and actively support its goals (Kalantarkousheh et al., 2014). It is also associated with affective attachment, employees who find meaning in their work are more likely to exhibit consistent effort, reliability, and discretionary behaviour (Al-Jabari & Ghazzawi, 2019; Maia & Bastos, 2015).

Highly committed employees contribute to reduced turnover, improved morale, and enhanced organisational performance (Salman et al., 2017; Klein, 2016). They are more self-regulated, requiring fewer external controls, and often serve as stabilising forces within teams (Ayers, 2017). Without strong commitment, leadership promises risk remaining aspirational rather than operational (Wort & Hewitt, 2018).

Spirituality

The term spirituality encompasses sacred values, moral consciousness, mysticism, and the pursuit of meaning (Kurniady et al., 2021). Rooted in the Latin spiritus, meaning breath, consciousness, or vigour, spirituality is viewed as a universal and enduring construct that acknowledges human uniqueness while offering broad relevance across cultures and traditions (Gupta & Singh, 2016; Thakadipuram, 2023). Its multidimensionality has been conceptualised by scholars, researchers, and spiritual leaders alike (Louise, 2021; MacDonald, 2023).

While spirituality is often seen as transcending religion, it remains inclusive of it, addressing fundamental questions of meaning, connection, and value (MacDonald, 2023; Westera, 2016). It reflects a person's inner need for love, coherence, and transcendence (Hyson, 2013; Spencer, 2012; Thakadipuram, 2023), and manifests as a desire to connect with others, the environment, and a Higher Power (Mackenzie & Servant, 2011; Scott, 2022). Spirituality also entails a commitment to universal values such as compassion, altruism, and truth (Spencer, 2012). Philosophical and cultural traditions offer varied interpretations. In Hindu thought, spirituality (adhyatma) refers to the inward search for higher consciousness and fulfilment (Bhawuk, 2019; Bharata, 2018). In Islamic thought, it is associated with meaning, serenity, and divine connection (Saritoprak & Abu-Raiya, 2023). From an African worldview, spirituality is inherently communal, rooted in collective well-being and relationality, encompassing human-to-human, human-to-nature, and human-to-divine connections (Knoetze, 2019; Singh & Bhagwan, 2020; Ibanga, 2022).

Fry (2009) frames spirituality as encompassing qualities of the human spirit, compassion, responsibility, harmony, and forgiveness, central to personal transformation and organisational life. While not dependent on religious affiliation, spirituality fosters a vision of service and self-transcendence (Sapta et al., 2021; Minnaar, 2007). Ultimately, spirituality offers a transformative worldview that deepens the individual's sense of purpose and connection with the universe (Lurie, 2012; Scott, 2022).

Workplace spirituality

Workplace spirituality is increasingly recognised as a human-centred organisational approach that fosters holistic and meaningful engagement (Samul, 2019; Lata & Chaudhary, 2020). It encompasses employees' desire to integrate personal values and spiritual identity into their professional lives, seeking purpose, fulfilment, and interconnectedness (Kokt & Palmer, 2019; Baykal, 2019). Unlike religion-specific frameworks, workplace spirituality is viewed as a universal human quality that transcends religious boundaries, enabling inclusivity across diverse belief systems (Lianto, 2023; Lategan & Kokt, 2022).

Defined as the intersection of personal spirituality and organisational culture, it provides a space for individuals to express core values, experience meaning beyond task performance, and engage with a sense of belonging (Garg & Saxena, 2020; Lianto, 2023). It nurtures employees' inner lives and contributes to both individual and collective well-being.

Scholars increasingly view workplace spirituality as a strategic response to modern organisational challenges, supporting creativity, resilience, and problem-solving (Sapta et al., 2021; Kotze et al., 2022). It energises employees, promotes care for others, and enhances motivation (Samul, 2019).

While there is broad agreement that workplace spirituality enhances purpose and meaning through value alignment and community, interpretations differ. Some highlight its inclusivity and universality, while others stress its instrumental value in addressing human resource concerns (Garg & Saxena, 2020; Kotze et al., 2022). Overall,

workplace spirituality is conceptualised as a dynamic and integrative practice that aligns personal and organisational dimensions to foster a sense of wholeness at work.

Spiritual Leadership

Spiritual leadership emerged from and largely incorporates many principles of leadership theories that operate within a spiritual paradigm (Veldsman & Andrew, 2017). This type of leadership emanates from leadership theories that emphasise principle-centred leadership, transformational leadership and workplace spirituality and is a way in which leaders satisfy themselves and others through spiritual aspects (James, 2017; Nurlasera, 2019). Spiritual leadership is regarded as an intimate leadership style where the aim is to create a work environment where employees have close and meaningful work relationships with each other (Samul, 2019). It refers to a type of leadership that places spiritual values as core in its leadership approach as a means to achieve a sense of calling and membership. Through the practice of spiritual leadership, a leader is able to address the basic needs of both leaders and followers which enables them to become more organised, committed and productive. This type of leadership results in integrity, ethics, humanism and respect (Sapta et al., 2021).

In comparison to earlier traditional leadership theories which historically gave more attention to a leader's authority, spiritual leadership offers a more value-based and spirit-centred leadership approach which places more emphasis on an employee's meaning of work by fulfilling their need for spiritual survival (Yang et al., 2019). Previous leadership theories are mostly focused on the follower's internal needs with less attention given to higher-order needs and the relationships between the values of followers (Baykal, 2019). Spiritual leadership offers a more holistic view of leadership in comparison to other leadership theories as it is not limited to only a single skill, trait or behaviour and is not limited by contextual factors found in other theories of leadership (Samul, 2019). Spiritual leadership qualities and characteristics include fairness, working more efficiently, having a sense of discipline but also being flexible, openness, honesty, being humble, maintaining ethical standards and upholding spiritual values (Nurlasera, 2019).

Spiritual leadership helps organisations achieve their goal of effectiveness. This is because when leaders are spiritually strong, the culture in the organisation would also be healthy and employees feel equally responsible to achieve goals and objectives of the organisation (Hassan & Nadeem, 2016). Spiritual leadership has the potential to lead the evolution of organisations to be more positive using humanity as a basis for achieving optimal performance (Nurlasera, 2019).

The Connection Between Spiritual Leadership and Organisational Commitment

Spiritual leadership builds upon foundational principles from transformational, principle-centred, and workplace spirituality theories (Veldsman & Andrew, 2017; James, 2017). It is characterised by value-driven leadership that seeks to address the inner needs of employees, cultivating meaning, calling, and membership within a supportive work environment (Samul, 2019; Nurlasera, 2019). Unlike traditional leadership models centred on authority, spiritual leadership integrates spiritual values to foster ethical conduct, commitment, and productivity (Sapta et al., 2021; Yang et al., 2019).

This leadership style adopts a holistic perspective, engaging the body, mind, heart, and spirit of both leaders and followers. It promotes traits such as humility, honesty, ethical standards, flexibility, and a strong sense of service (Baykal, 2019; Samul, 2019). When practised effectively, spiritual leadership enhances organisational culture, inspires accountability, and drives collective goal achievement (Hassan and Nadeem, 2016).

Empirical studies affirm that spiritual leadership positively predicts organisational commitment (Jufrizen et al., 2019; Sapta et al., 2021). It supports employee well-being by reducing emotional strain and reinforcing trust (Meng, 2016; Tabor et al., 2020). Fry (2003) emphasises that this model aligns individual and organisational values, thereby increasing productivity and deepening engagement.

Additional evidence links spiritual intelligence with heightened motivation and alignment of personal values with organisational purpose (Balaban et al., 2018). Research by Riana (2021) confirms that spiritual leadership strengthens employees' sense of calling, further promoting commitment. A comprehensive review by Lahmar et al. (2023) validates the long-term impact of spiritual practices on fostering a sense of meaning, connectedness, and loyalty in the workplace.

Workplace spirituality, comprising dimensions such as inner life, community, and meaning, also contributes to commitment by encouraging self-actualisation and a sense of purpose beyond routine tasks (Pathak et al., 2017; Bodla & Ali, 2012; Sapta et al., 2021). When employees feel their work reflects personal and communal values, they become more engaged and aligned with organisational objectives.

In sum, spiritual leadership cultivates trust, engagement, and self-actualisation, aligning the personal aspirations of employees with collective goals. This integration enhances commitment and positions spiritual leadership as a sustainable approach to leading ethically and holistically (Tabor et al., 2020; Sapta et al., 2021).

RESEARCH METHODOLOGY

This study employed a qualitative, exploratory, interpretative phenomenological approach. To enhance epistemological transparency, this study acknowledges the inherently interpretative nature of IPA, recognising the dual hermeneutic process wherein the researcher actively co-constructs meaning while making sense of participants' sense-making, shaped by their own positionality and reflexive engagement (Smith, Flowers & Larkin, 2009; Pietkiewicz & Smith, 2014). Primary data were collected through face-to-face, semi-structured interviews with nine senior managers from a large South African Mining and Infrastructure Equipment organisation. The sample reflected South Africa's demographic diversity. In an Interpretative Phenomenological Analysis (IPA) study, a sample of nine participants is considered more than sufficient due to the methodological emphasis on depth rather than breadth. IPA is ideographic, aiming to provide a detailed, nuanced understanding of individual lived experiences rather than generalisable findings. Smith, Flowers, and Larkin (2009) suggest that small, purposively selected samples, typically between 6 and 10 participants, allow for rich, in-depth analysis while maintaining methodological rigour. Additionally, Pietkiewicz and Smith (2014) affirm that smaller samples in IPA facilitate a detailed case-by-case analysis and support the interpretative commitment to understand meaning-making processes within a specific context.

The interview guide comprised eleven questions, designed to explore participants' lived experiences of spiritual leadership. Data were analysed using an inductive thematic analysis approach, appropriate for phenomenological inquiry due to its emphasis on meaning-making and individual perspectives (Clarke & Braun, 2017; Chang & Wang, 2021). This process involved close reading, systematic coding, and the identification of emergent themes grounded in participant narratives (Spiers & Smith, 2020). Rigorous adherence to participant voice and interpretive fidelity was maintained throughout (Sutton & Austin, 2015).

RESULTS

Five major themes emerged from the analysis. Based on these themes and informed by the literature review, a Conceptual Model of Spiritual Leadership, Trust and Organisational Commitment is proposed (see Figure 1). This model integrates findings from previous research with insights derived from participant data, reflecting the researchers' overall understanding gained from the study.

The proposed model (Figure 1) consists of eight components and aims to illustrate the connection between Spiritual Leadership concepts, (i.e. vision, hope and faith), and the achievement of organisational commitment mediated through trust.

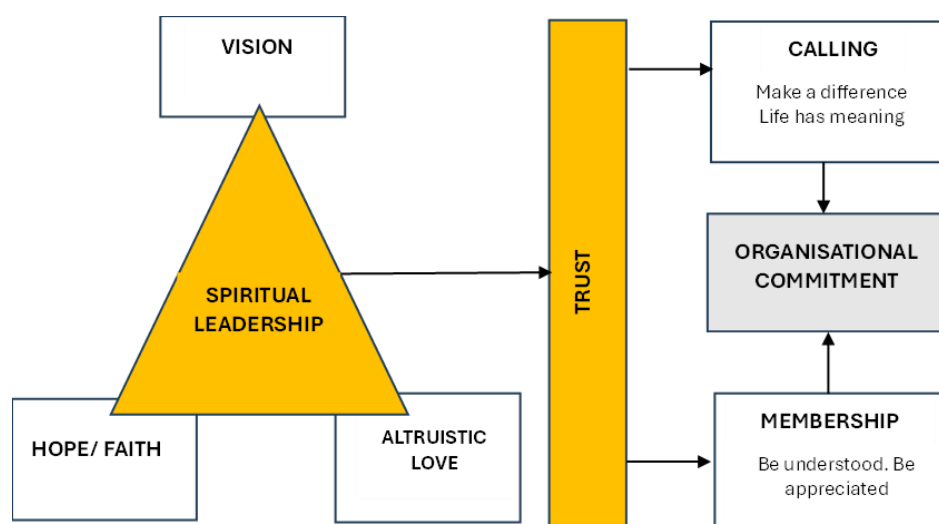


Figure 1. *Conceptual Model of Spiritual Leadership, Trust and Organisational Commitment*

In the proposed conceptual model, vision occupies a central and elevated role, symbolising the aspirational core of the organisation's spiritual direction. Positioned metaphorically at the apex of a triangle, vision provides a unifying purpose that informs strategic direction and motivates collective effort. Fry (2003) conceptualises vision within spiritual leadership as a shared image of a desirable future, offering clarity of purpose and alignment of individual and organisational values. It encourages employees to internalise organisational goals, fostering a sense of personal investment in organisational outcomes (Yang et al., 2019; Nguyen et al., 2018). As Chai et al. (2017) suggest, a clearly articulated vision enhances decision-making and enables coordinated action across diverse organisational functions. When vision is shared, it uplifts employees by providing a sense of higher purpose and stimulates engagement through emotional and motivational resonance (Ayers, 2017).

Hope and faith are fundamental to the enactment of the organisational vision. These values do not merely represent optimistic outlooks but constitute enduring motivational forces that sustain belief in the future amid adversity. Fry (2003) underscores that hope and faith energise employees to persevere through challenges, fostering a proactive commitment to organisational objectives. They catalyse a 'do-what-it-takes' mentality, promoting resilience, determination, and a readiness to overcome obstacles (Dik & Alayan, 2023). Faith, in this context, extends beyond anticipation to encompass confidence in the ethical and purposeful trajectory of the organisation (Nguyen et al., 2018). Soto (2017) further asserts that hope and faith are embedded in attitudes of perseverance and openness, which are essential for sustaining commitment in volatile work environments.

Altruistic love represents the ethical and emotional dimension of spiritual leadership, encompassing attitudes such as compassion, kindness, humility, and forgiveness. This form of love fosters interpersonal respect and encourages leaders to build caring, ethical, and cohesive organisational communities (Fry & Egel, 2017; Dik & Alayan, 2023). It promotes trust and belonging by nurturing psychological safety and mutual appreciation. Baykal (2019) characterises altruistic love as a harmonising force that enhances interpersonal relationships, while Kumar (2017) defines it as unconditional care exchanged between leaders and followers in pursuit of a shared vision. Within this framework, love becomes both an ethical foundation and a relational mechanism that strengthens organisational cohesion.

Spiritual leadership is constructed through the integration of vision, hope and faith, and altruistic love. These elements form the basis of a leadership style that is holistic, values-based, and attuned to employees' deeper existential needs (Jufrizen et al., 2019). Spiritual leadership seeks to satisfy not only functional expectations but also the human desire for meaning, belonging, and purpose (Soto, 2017). As such, it nurtures the conditions necessary for trust to emerge, trust being an indispensable precursor to organisational commitment.

Trust functions as the mediating link between spiritual leadership and commitment. The findings of this study affirm that trust in leadership is a non-negotiable condition for employee engagement and loyalty. Participants consistently indicated that spiritual values such as authenticity, transparency, and care generate trust, which in turn inspires dedication to organisational goals. When leaders demonstrate integrity and genuine concern for employee well-being, trust becomes the mechanism through which commitment is cultivated and sustained.

Calling, as conceptualised by Fry (2003), refers to an individual's sense that their work is meaningful and contributes to the greater good. Within the model, calling is a manifestation of spiritual well-being, arising when employees perceive alignment between their values and their roles in the organisation (Nguyen et al., 2018). This sense of purpose motivates high performance and enhances collaboration (Samul, 2019). Importantly, calling is enabled by trust, as employees are more likely to discover meaning in their work when they believe in the authenticity and ethical intent of their leaders.

Membership complements calling by addressing employees' social and relational needs. It encompasses the experience of being valued, included, and understood within an organisational context (Fry, 2003). When employees experience membership, they are more likely to develop a sense of attachment and loyalty to the organisation. The model posits that trust underpins this sense of belonging; employees who trust their leaders feel psychologically safe and are thus more open to engaging deeply with their teams and organisational mission.

Organisational commitment is the cumulative outcome of the preceding components. It reflects an employee's emotional and psychological attachment to the organisation and manifests in behaviours that support organisational effectiveness. The study confirms that spiritual leadership, through its emphasis on vision, trust, calling, and membership, plays a critical role in fostering such commitment. As Riana (2021) argues, commitment is not merely functional but is rooted in psychological identification with the organisation's purpose and values.

These findings align with extant scholarship that links spiritual leadership to enhanced employee commitment, mediated by the presence of authentic, values-based leadership behaviours (Jufrizen et al., 2019; Sapta et al., 2021). Participants noted that spiritual leadership is effective in cultivating trust, particularly when leaders act with integrity, humility, and a sense of service. These attributes not only reduce psychological strain but also contribute to employee well-being, a critical antecedent of sustained commitment (Tabor et al., 2020).

Practices such as transparent communication, inclusive decision-making, and leader authenticity further reinforce trust and, by extension, commitment. Participants recommended embedding spirituality into organisational culture through various strategies. These include creating dedicated spaces for reflection, integrating spiritual values into leadership development, and increasing the visibility of the organisational vision. Additionally, fostering open dialogue, promoting inclusivity, and sharing leadership stories that reflect spiritual practices were seen as effective methods for institutionalising spiritual values.

Ultimately, the data supports the proposition that spiritual leadership is a viable and ethically grounded model for cultivating organisational commitment. By attending to employees' spiritual, emotional, and relational needs, leaders create environments that support both individual flourishing and collective performance. The integration of trust, calling, and membership into leadership practice not only advances theoretical models of commitment but also provides practical pathways for enhancing organisational resilience and cohesion.

CONCLUSION AND RECOMMENDATIONS

This study demonstrates that spiritual leadership significantly contributes to fostering organisational commitment by integrating vision, trust, calling, and community within a values-based leadership paradigm. The findings affirm that spiritual leadership addresses not only functional needs but also deeper existential concerns of employees, such as purpose, belonging, and self-actualisation. Through its holistic approach, spiritual leadership enhances psychological well-being and engagement, making it a viable model for ethically grounded and sustainable organisational cultures.

The conceptual model presented herein advances theoretical understanding by situating trust as a mediating mechanism through which spiritual values translate into affective commitment. Practically, the model offers leaders a framework to align personal and organisational values, thereby enhancing retention and motivation.

While the findings offer rich, context-specific insights into the lived experiences of participants, they are not intended to be generalised across sectors or regions without careful adaptation to local organisational cultures and socio-economic conditions.

Recommendations for Practice

Leadership Development: Organisations should incorporate spiritual leadership principles into training programmes, emphasising emotional intelligence, ethical conduct, and value-based decision-making.

Cultural Alignment: Workplace environments should be structured to support calling and community by fostering meaningful work and collective identity.

Trust Cultivation: Leaders must actively build and maintain trust through authentic behaviour, transparency, and consistent ethical standards.

Strategic Integration: Human resource policies should reflect spiritual values by promoting wellness, purpose-driven work, and inclusivity.

To support the operationalisation of spiritual leadership, organisations may draw on Grobler and Sibanda (2024) work and measuring instrument, which emphasises measurable practices such as vision alignment, altruistic love, and organisational commitment. By integrating values-based leadership assessments, employee engagement surveys focusing on meaning and purpose at work, and leadership development programmes that cultivate inner life practices and ethical influence SL may further be supported.

Organisations are encouraged to integrate selected principles of spiritual leadership, such as fostering a sense of purpose, compassion, and ethical influence, into existing HR practices in a context-sensitive manner that aligns with organisational values and supports employee well-being.

Recommendations for Future Research

Further empirical studies are needed across diverse sectors and cultural contexts to examine the generalisability of the proposed model.

A longitudinal quantitative study is recommended to assess the sustained impact of spiritual leadership interventions on employee retention and key organisational outcomes over time.

Comparative studies may investigate the differential effects of spiritual leadership relative to other value-driven leadership models.

Future research could build on these findings by employing a quantitative design to examine the relationships between spiritual leadership dimensions and organisational outcomes across diverse sectors, thereby enhancing generalisability and empirical robustness.

In conclusion, spiritual leadership offers a compelling and integrative approach for cultivating committed, motivated, and ethically grounded organisational cultures in an increasingly complex and human-centred work environment.

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INNOVATION DIGITAL TRANSFORMATION: CHALLENGES, OPPORTUNITIES, AND INSPIRATIONS FOR THE BUSINESS ENVIRONMENT IN SLOVAKIA

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Abstract:

Key processes associated with innovation and digital transformation in the business environment in Slovakia are closely tied to the implementation of EU strategies and programs, which address the challenges of the 21st century. The Digital Europe Program (2021–2027) is one of the first EU financial instruments aimed at bringing modern technologies closer to citizens and businesses. According to Angela Merkel, “Digitalization is the key to the future because it enables innovation and transformation in all areas of life,” and it is one of the six pillars of the EU Recovery and Resilience Plan. Slovakia, as part of the EU, faces its own specific challenges and opportunities in the field of innovation management and digital transformation. On the one hand, there is significant potential, especially in the area of small and medium-sized enterprises, which constitute a vital part of the Slovak economy. On the other hand, Slovakia still lags behind the EU average in many key digitalization indicators, such as digital skills, the adoption of digital technologies, and access to innovative forms of financing. This underscores the need for stronger support for digitalization, not only from the state but also through European programs and initiatives. This article will explore how Slovakia is implementing global strategies and how these contribute to enhancing efficiency, productivity, and competitiveness.

Keywords: innovation, digital transformation, SMEs, Industry 4.0, business environment

INTRODUCTION

The world we live in today is changing at an extraordinary pace. Innovation has become the primary driving force of progress, transforming every aspect of our lives. Whether in healthcare, transportation, education, or information technology, innovation is pushing the boundaries of what is possible and offering new solutions to the challenges we face as a society. Each innovation represents a step toward a better future, enabling us to use technologies that, just a few years ago, seemed like distant science fiction. Innovations involve the introduction of new products or services, new methods of production, the opening of new markets, or changes in organizational structure (Schumpeter, 1934).

Innovation can be understood as the practical implementation of new ideas into products, services, processes, systems, and social relations. It refers to the introduction of changes that are new to a society, business, or group. Generally, it is a process in which existing elements are combined in a new way in order to create something unique (Hrašková, 2008).

Innovation, as a concept, offers companies a way to navigate the rapidly evolving world of technology and discovery. Since innovation plays a crucial role in guiding companies toward a better future, it is essential to note that innovation concepts must be managed with care. Innovation management, in turn, requires a specific and strategic approach to effectively implement changes aimed at improvement. This process involves selecting from a range of feasible options—those that offer the highest potential for success (Matriano, 2021).

Adopting a strategic innovation perspective enables companies to view their entire business holistically, not just the products and processes that generate cash flow. The success of globally recognized companies often depends on innovation integrated with a comprehensive and systematic approach (Dogan, 2017).

It should be noted that the overall positive impact of innovation can be uncertain in the short term. Innovations may increase input costs and simultaneously lead to outcomes that only partially affect production—either positively or negatively. In many cases, the operating returns from production do not offset the higher investment costs. Such an inverse relationship has indeed been demonstrated through the technology index. One possible explanation for these findings may involve the spatial factor, which is an inherent component of innovation (Foltz and Lang, 2003).

Greater success with innovation is often associated with increased knowledge and efficiency. It should be noted, as previously mentioned, that no significant correlation was found between years of experience and farm profitability (Stefanides-Tauer, 1999).

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However, in the long term, various factors intricately influence the relationship between innovation and farm profit. While innovations typically involve upfront costs, their benefits may not be realized until beyond the first year—benefits that are usually assessed through long-term profitability. This time lag can sometimes discourage farmers from adopting innovations. When innovations are adopted, annual reporting may distort their outcomes. For instance, if an innovation incurs costs in the first year but results in increased profit in the second year, annual reports may show a decline in profit initially and a rise in revenue only later, as the expenses and returns fall into different accounting periods. Therefore, the implementation of bioeconomy-based innovations represents a vital strategic effort to enhance long-term profitability.

Innovations can be categorized into several types, each having a distinct impact on both the company and its customers (Tidd & Bessant, 2013). Product innovations focus on the development and introduction of new or improved products that offer greater value or enhanced functionality to customers. Process innovations aim to improve production and operational procedures to increase efficiency and reduce costs. Organizational innovations involve changes in a company's management and structure that lead to better coordination and communication within the organization (CityMagazine, 2024). Marketing innovations emphasize new approaches to the promotion and sale of products and services (Christensen, 1997).

MATERIALS AND METHODS

The aim of this work is to highlight the challenges and opportunities associated with innovation management and digital transformation within the business environment in Slovakia. It also seeks to identify inspiring approaches and recommend measures to enhance the competitiveness and innovation performance of Slovak enterprises.

To achieve this goal, the focus will be placed on the key challenges Slovak businesses face in the areas of innovation management and digital transformation. Additionally, the study will explore the opportunities that these processes offer for the Slovak business environment. The work will also showcase several successful examples—both domestic and international—of innovative practices and digital transformation initiatives that can serve as inspiration for Slovak companies.

An important part of this work will be the formulation of recommendations for businesses, the government, and supporting institutions in Slovakia, aimed at enhancing innovation performance and ensuring a successful digital transformation.

METHODOLOGY

This work will apply both qualitative and quantitative research methods to comprehensively examine innovation management and digital transformation in Slovak enterprises.

Literature Review - We will process relevant domestic and international scientific literature focused on innovation management, digital transformation, competitiveness, and the business environment. This includes the analysis of academic articles, books, studies, reports, and strategic documents—such as Slovakia's Innovation Strategy and the European Union's digitalization strategies.

Qualitative Research - Through case studies, we will analyze specific examples of both successful and unsuccessful implementation of innovation management and digital transformation in Slovak companies.

Quantitative Research - We will utilize existing statistical data from sources such as Eurostat, the European Commission, the Statistical Office of the Slovak Republic, and other relevant institutions to quantify the level of digitalization, innovation activity, and competitiveness of Slovak enterprises.

RESULTS AND DISCUSSION

DIGITAL EUROPE PROGRAMME

The Digital Europe Programme is one of the EU's first financial instruments aimed at bringing advanced technologies closer to both citizens and businesses. The programme supports the implementation of modern technologies to drive digital transformation and is being carried out during the 2021–2027 period.

The EU is addressing the need for digitalisation through its Recovery and Resilience Plan, which aims to make Europe “greener, more digital, and more resilient.” Digital transformation is one of the six main pillars of this plan. A key development in supporting SMEs in their digital transformation journey is the European Commission's Communication of 10 March 2020, entitled “An SME Strategy for a Sustainable and Digital Europe” (European Commission, 2020). This strategy aspires to “provide targeted advice on sustainability and digitalisation, while also connecting support structures so that every SME can access assistance close to home.” It is built upon three main pillars:

- Building capacities and supporting transformation towards sustainability and digitalisation;
- Reducing regulatory burdens and improving market access;

- Improving access to finance.

The online business environment within the European Union is dynamic and constantly evolving. EU policy places strong emphasis on:

- Supporting innovation and key digital technologies;
- Upholding ethical principles and values in relation to artificial intelligence;
- Strengthening Europe's cybersecurity capabilities;
- Increasing digital skills;
- Developing a "Gigabit Society", including the rollout of 5G technologies.

BUSINESS ENVIRONMENT IN SLOVAKIA

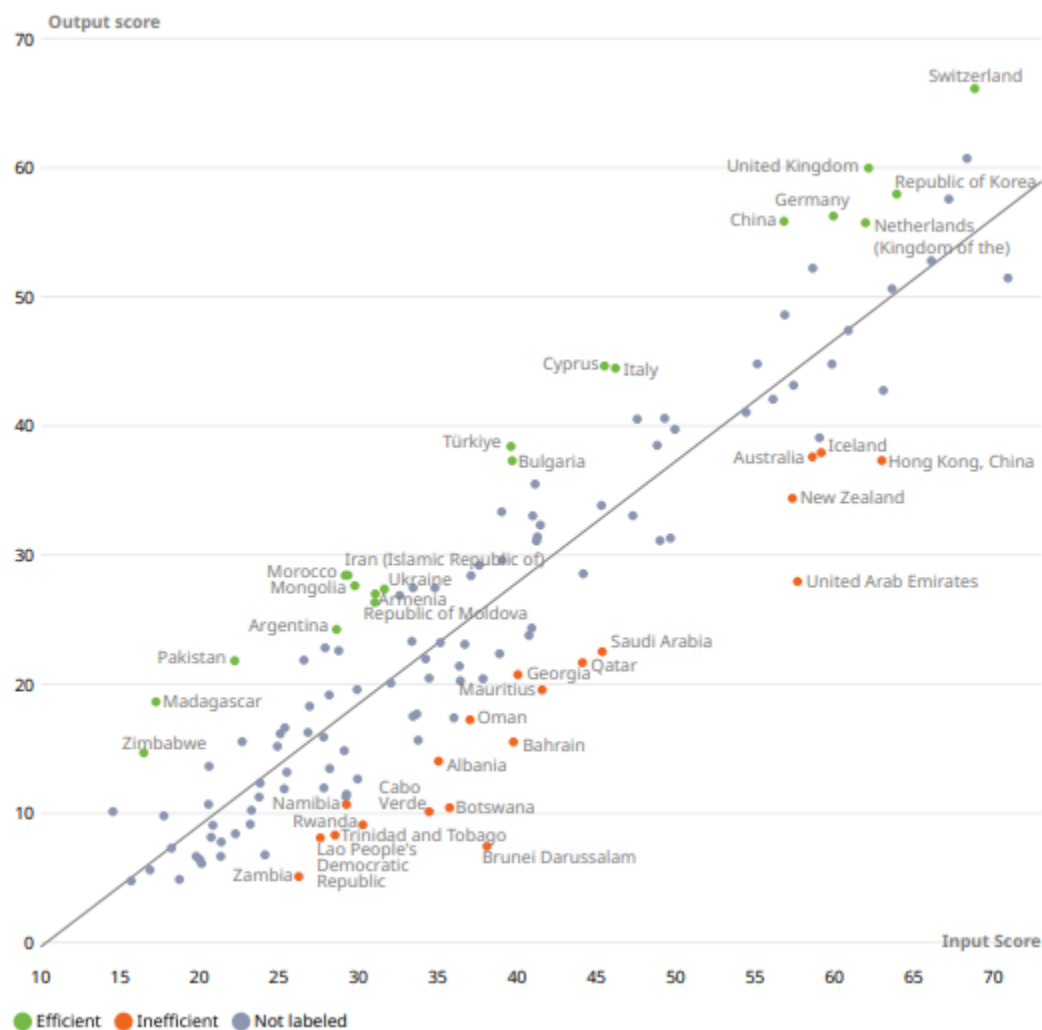
The business environment in Slovakia is significantly shaped by the structure of its economy, which is dominated by small and medium-sized enterprises (SMEs), accounting for more than 99% of all businesses. SMEs play a crucial role in employment and contribute substantially to the country's economic growth. Slovakia's business environment is highly industry-oriented, with the automotive sector being one of its most important pillars. Additionally, the presence of multinational corporations contributes to economic stability, but also increases the country's dependency on global market trends.

In 2024, a total of 993,000 vehicles were produced in Slovakia. The automotive sector directly employs more than 165,000 people, with total employment in the sector reaching 244,000. The automotive industry accounts for 9.2% of Slovakia's gross domestic product, making it the most important sector and the main driving force of the national economy.

Thanks to four established car manufacturers—Volkswagen, Stellantis, Kia, and Jaguar Land Rover—and more than 350 local suppliers, Slovakia is the world leader in car production per capita. In 2022, Swedish premium car manufacturer Volvo also chose Slovakia as the location for its newest production plant.

According to the European Commission, the automotive industry is essential to the prosperity of Europe as a whole. It provides direct and indirect employment for 13.8 million Europeans, representing 6.1% of total EU employment. Of these, 2.6 million are employed directly in motor vehicle production, which makes up 8.5% of total industrial employment across the EU. Slovakia leads the EU-27 in terms of workforce exposure to the automotive industry, with 16% of its industrial workforce engaged in this sector.

However, the broader Slovak business environment faces significant challenges. In the latest Global Innovation Index (GII) 2024 by the World Intellectual Property Organization (WIPO), Slovakia ranked 46th out of 133 countries. Notably, its business environment ranked a low 124th, indicating high levels of uncertainty and persistent challenges for entrepreneurs. Among the EU-27, only Romania scored lower in this category.



Note: Line corresponds to the fitted line between the input score and output score of all economies included in the GII 2024.

Figure 1: Innovation input to output performance, 2024
Source: Global Innovation Index Database, WIPO, 2024.

The European Innovation Scoreboard (EIS), compiled by the European Commission, provides a comprehensive assessment of the research and innovation environment in EU member states. Slovakia ranks below the EU-27 average in most of the monitored indicators, highlighting the need to intensify efforts in supporting innovation and research.

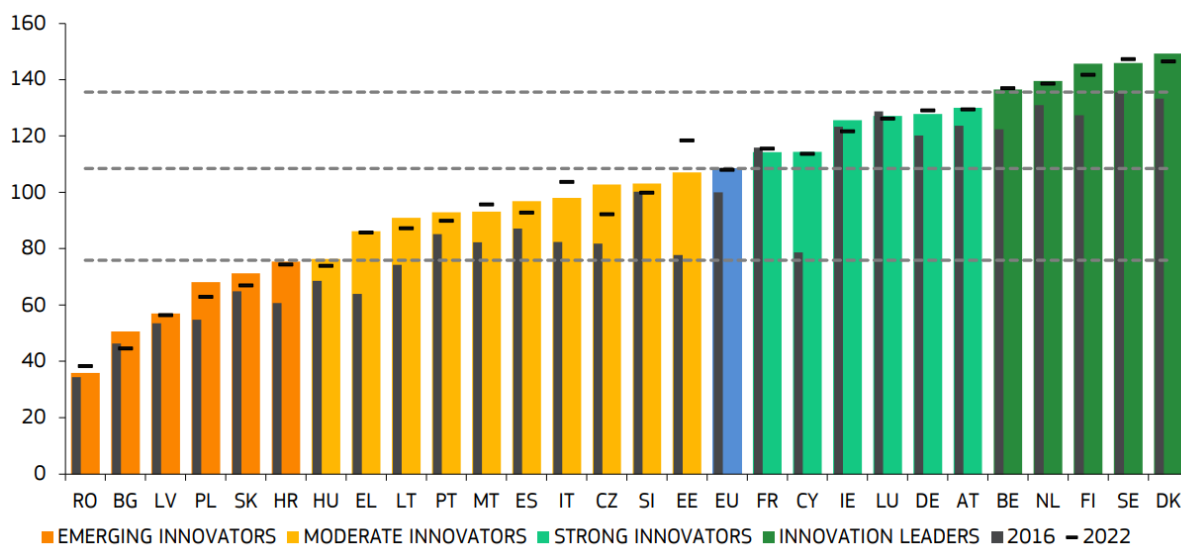


Figure 2: Performance of EU Member States' innovation systems
Source: EIS 2023

Compared to other European Union Member States, Slovakia has several specific characteristics. Digitalisation, which is currently a key factor in economic development, lags behind the EU average. This issue is particularly visible in the insufficient use of digital technologies by small businesses and the low level of digital skills among the population.

On the positive side, Slovakia has a qualified workforce, especially in technical fields. However, the country faces brain drain and labor shortages in certain regions.

The Slovak business environment faces several major challenges. Companies need to invest in modern technologies and digitalisation processes, which require financial resources and expertise that are often lacking. Bureaucracy and frequent legislative changes pose additional obstacles to business operations. Furthermore, there are significant regional disparities in economic development, with eastern Slovakia lagging the western part of the country.

Despite these challenges, the business environment in Slovakia offers many opportunities. One of the most significant is the availability of funding from European Union sources, which companies can use for digitalisation, innovation, and internationalisation. Slovakia's growing startup ecosystem, supported by incubators and accelerators, also creates favorable conditions for the development of innovative projects. In addition, Slovakia's strategic location in Central Europe allows for easier expansion into neighboring markets and makes it easier to leverage the advantages of the EU single market.

The following figure presents the 10 main constraints of the business environment in Slovakia compared to regional averages, based on the Enterprise Surveys Slovakia 2023 conducted by the World Bank.

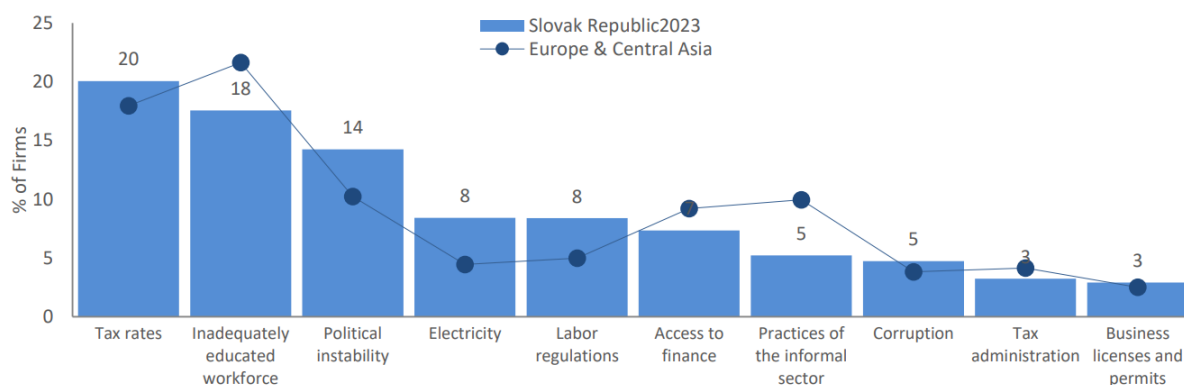


Figure 3: Top ten business environment constraints
Source: Enterprise Surveys

Strategic and conceptual documents that address the challenges of technological progress include the Digital Transformation Strategy of Slovakia 2030. This strategy outlines the policy direction and specific priorities of the Slovak Republic in the area of digital transformation. Slovakia's overarching goal is to modernize its economy by

2030 through the adoption of innovative and environmentally friendly industrial solutions, supported by a knowledge-based data economy.

Another key document is the Slovakia 2021–2027 Programme, which serves as the main programming framework for utilizing European Union funds in Slovakia during the 2021–2027 period. This programme is designed to ensure more efficient and flexible use of EU resources and acts as a key investment instrument aimed at improving the quality of life for the Slovak population. It focuses on several critical areas, including environmental and climate goals, innovation, education, and regional development.

DIGITALIZATION OF THE BUSINESS ENVIRONMENT

In the field of digitalization, Slovakia is on par with other V4 countries, but lags behind more developed OECD and EU nations. As a result, digital transformation has become a national priority. In the context of enhancing business competitiveness, Slovakia aims to establish an innovative digital and data-driven economy.

A key approach to achieving this goal is through supporting the adoption of digital technologies and enhancing the digital skills of small and medium-sized enterprises (SMEs).

The National Digital Skills Strategy of the Slovak Republic and the Action Plan for 2023–2026 set out a framework and specific steps to improve the digital skills of Slovakia’s population. The strategy aims to ensure that all citizens have access to the digital competencies necessary for success in the digital economy and society.

A major challenge for both Slovakia and the EU is falling behind in the field of artificial intelligence (AI). Compared to the United States and China, AI investments in the EU are significantly lower. While the US invested \$62 billion and China \$7.3 billion in AI, Europe lags with only \$5.5 billion. This investment gap could have serious consequences, especially as a few major companies—none of them European—are expected to dominate the AI landscape.

Despite these challenges, the digitalization of businesses in Slovakia presents many opportunities to enhance efficiency, competitiveness, and innovation. Key areas where Slovak companies can leverage digitalization include:

Automation and Industry 4.0

The automation of production processes and the adoption of Industry 4.0 technologies—such as robotics, the Internet of Things (IoT), and AI—can significantly boost productivity, lower costs, and improve monitoring and optimization of manufacturing.

Digital Payments and FinTech

Implementing digital payment systems and using FinTech solutions can simplify financial operations, enhance cash flow, and improve the security of transactions. Examples include platforms like PayPal, Stripe, or local digital payment solutions.

Cybersecurity

As digitalization advances, protecting sensitive data and systems from cyber threats is crucial. Investing in cybersecurity measures such as encryption, firewalls, and regular monitoring is key to safeguarding corporate information.

Support for Innovation and Research

Businesses can take advantage of various grants and financial incentives to foster innovation and research in digital technologies.

Education and Digital Skills Development

Investing in employee training in digital skills is essential for successful digital transformation. Collaboration between companies and educational institutions can help upskill the workforce and prepare them for the digital economy.

Digital Transformation of Public Administration

Businesses benefit from a digitalized public administration, which simplifies bureaucracy and improves access to public services. Examples include electronic documents, online registrations, and digital signatures—all of which make doing business easier.

E-commerce

Developing and optimizing e-commerce platforms, including the use of social media and digital marketing, can help businesses attract new customers and enhance customer experience.

Benefits of Digitalization

- Increased efficiency and productivity – Streamlining operations through process automation and the use of digital tools leads to higher productivity, reduced costs, and time savings.
- Better communication – Digital tools enhance internal and external communication across various platforms.
- Better decision-making – Access to real-time data and analytics improves the quality and speed of business decisions.
- Improved customer service and experience – Digitalization enables more personalized, faster, and more efficient interactions with customers.

Disadvantages of Digitalization in Slovakia

- High costs – Initial investments in technology and training can be financially demanding, especially for small and medium-sized enterprises (SMEs).
- Security risks – Increased reliance on digital systems raises the risk of cyberattacks, data breaches, and privacy concerns.
- Lack of qualified IT professionals – Slovakia faces a shortage of skilled workers in the IT sector, which slows down the implementation of digital solutions.

The level of online business in Slovakia, according to the Digital Economy and Society Index, is shown in Figure 4.

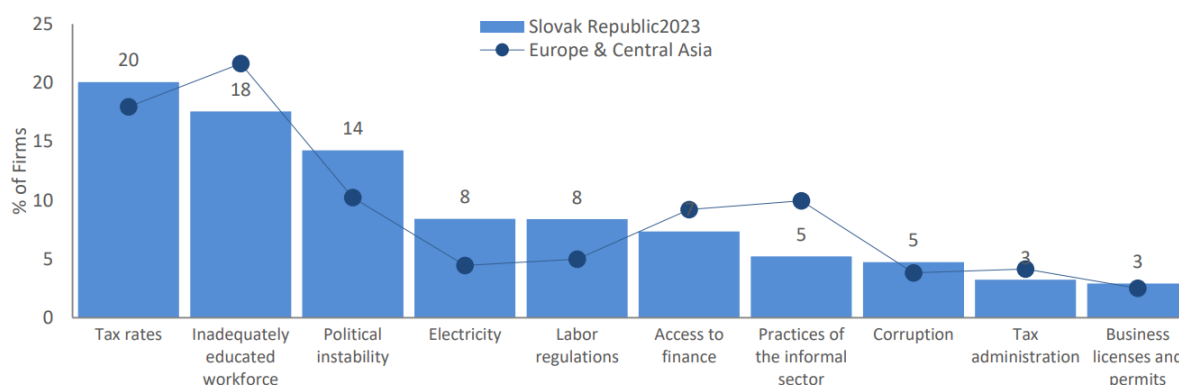


Figure 4: The level of online business in Slovakia
Source: DESI

The level of online entrepreneurship in Slovakia lags behind the European Union (EU) average, which is reflected in various aspects of the digital transformation of businesses. According to the Digital Economy and Society Index (DESI) 2021, Slovakia ranked 22nd out of 27 EU Member States, achieving a score of 43.2, while the EU average was 50.7.

In February 2020, the European Commission approved the Digital Package, which includes three key documents:

- Shaping Europe's Digital Future
- A European Data Strategy
- Excellence and Trust in Artificial Intelligence

On 9 March 2021, the European Commission published the Communication on the Digital Compass to 2030. It is a response to the COVID-19 pandemic, which changed perceptions of the importance of digitalisation in society and the economy, and accelerated the pace of digital transformation. The document outlines specific objectives in four key areas:

- Digital skills
- Digital infrastructure
- Digital transformation of enterprises
- Digitalisation of public services

The Digital Europe Programme is one of the first EU financial instruments designed to bring technology closer to citizens and businesses. The programme aims to finance the implementation of modern technologies to support digital transformation and runs from 2021 to 2027.

INNOVATIVE ECONOMY

Traditional and innovative economies represent two different approaches to economic growth, entrepreneurship, and value creation. While the traditional economy relies on stable, often industrial sectors with a focus on efficiency and mass production, the innovative economy emphasizes creativity, new technologies, and constant adaptation to changing conditions.

It brings rapid growth and dynamism but also involves a higher degree of risk. The innovative economy supports the entrepreneurial ecosystem—including startup culture and venture capital—reduces dependence on physical resources and promotes digitalization.

What makes it especially relevant today is its potential to address global challenges, such as:

- Climate change
- Urbanization
- Energy efficiency

The business models of the innovative economy are shaped by rapidly changing market conditions, technological advancement, and evolving consumer behaviour. They are characterized by:

- Digitalization
- The sharing economy
- Personalized services
- Data-driven decision making

CONCLUSION

Selected examples of innovation and digitalization successes in Slovak companies:

1. Volkswagen Slovakia

Volkswagen Slovakia demonstrates high efficiency and quality in its automotive production processes, showcasing successful digital transformation and innovation in the industry.

An excellent example of innovation is the use of FTS (Fahrerloses Transportsystem)—automated guided vehicles. These are developed by the Slovak company CEIT in close collaboration with the Slovak University of Technology in Bratislava. The FTS systems operate using magnetic strips on the floor and ensure timely and accurate delivery of materials across nearly all production halls, significantly enhancing logistics and operational efficiency.

Picture 1: Robotization at Volkswagen



Source: Volkswagen

2. Magna Slovteca s.r.o.

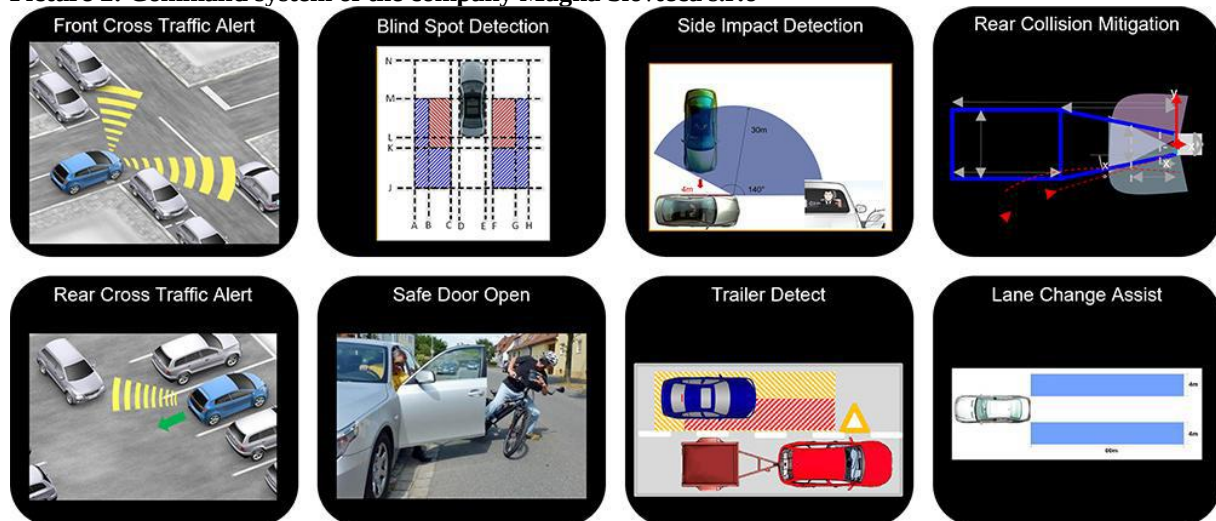
Magna Slovteca s.r.o., a subsidiary of the Canadian corporation Magna International, specializes in producing components for leading global automotive brands.

Magna International is recognized as a pioneer in automotive innovation, offering cutting-edge technologies that enhance vehicle safety and performance. Notable innovations include:

- ICON Radar – an advanced digital radar system designed for precise object detection, improving driving awareness and accident prevention.
- ClearView™ Vision System – enhances driver visibility and overall safety through intelligent camera and display technologies.
- Interior Sensing Systems – utilizes facial and behavioral recognition to monitor driver alertness and passenger conditions, contributing to both safety and comfort.

These technologies reflect Magna's commitment to smart mobility solutions and represent a step forward in the global digital transformation of the automotive industry.

Picture 2: Command system of the company Magna Slovteca s.r.o



Source: Magna Slovteca s.r.o.

3. Tatra Banka, a.s.

Tatra Banka, a.s. is one of the largest and most influential financial institutions in Slovakia. Founded as the first private bank in the country, it has played a crucial role in shaping the Slovak banking sector.

Since 2019, Tatra Banka has been part of Raiffeisen Bank International, one of the strongest banking groups in Austria. This partnership has accelerated its growth and strengthened its position in the Slovak market.

Tatra Banka is a leader in banking innovation, particularly in the areas of:

- Digital banking – offering advanced mobile and internet banking services.
- Artificial intelligence – implementing AI-driven solutions for customer support and personalized financial services.
- Cybersecurity – maintaining high standards for secure transactions and data protection.

Its continuous investment in digital transformation makes Tatra Banka a model for modern banking in Central Europe.

Picture 3: Tatra Banka card design



Source: Tatra banka

Based on the analysis of the innovation economy and digitalization in the conditions of enterprises in Slovakia, we propose the following recommendations in the areas:

For enterprises:

- Strategies for more effective implementation of innovation management (e.g. open innovation, agile methodologies).
- Approaches to successful digital transformation (e.g. selection of appropriate technologies, development of digital skills).
- Building an innovation culture in the organization.
- Possibilities of cooperation with research institutions and other enterprises.
- Use of existing support programs and tools.

For the government and support institutions (e.g. SARIO, Slovak Business Agency):

- Improving the legislative and regulatory environment for innovation and digital transformation.
- Supporting investments in research, development and innovation.
- Initiatives for the development of digital skills and education.
- Supporting the internationalization of innovative Slovak companies.
- Streamlining and better coordination of existing support programs.
- Creating platforms for cooperation between businesses, research and public administration.

For the business environment as a whole:

- Supporting the creation of innovation ecosystems and clusters.
- Raising awareness of the importance of innovation and digital transformation.
- Supporting connections with international innovation networks.

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