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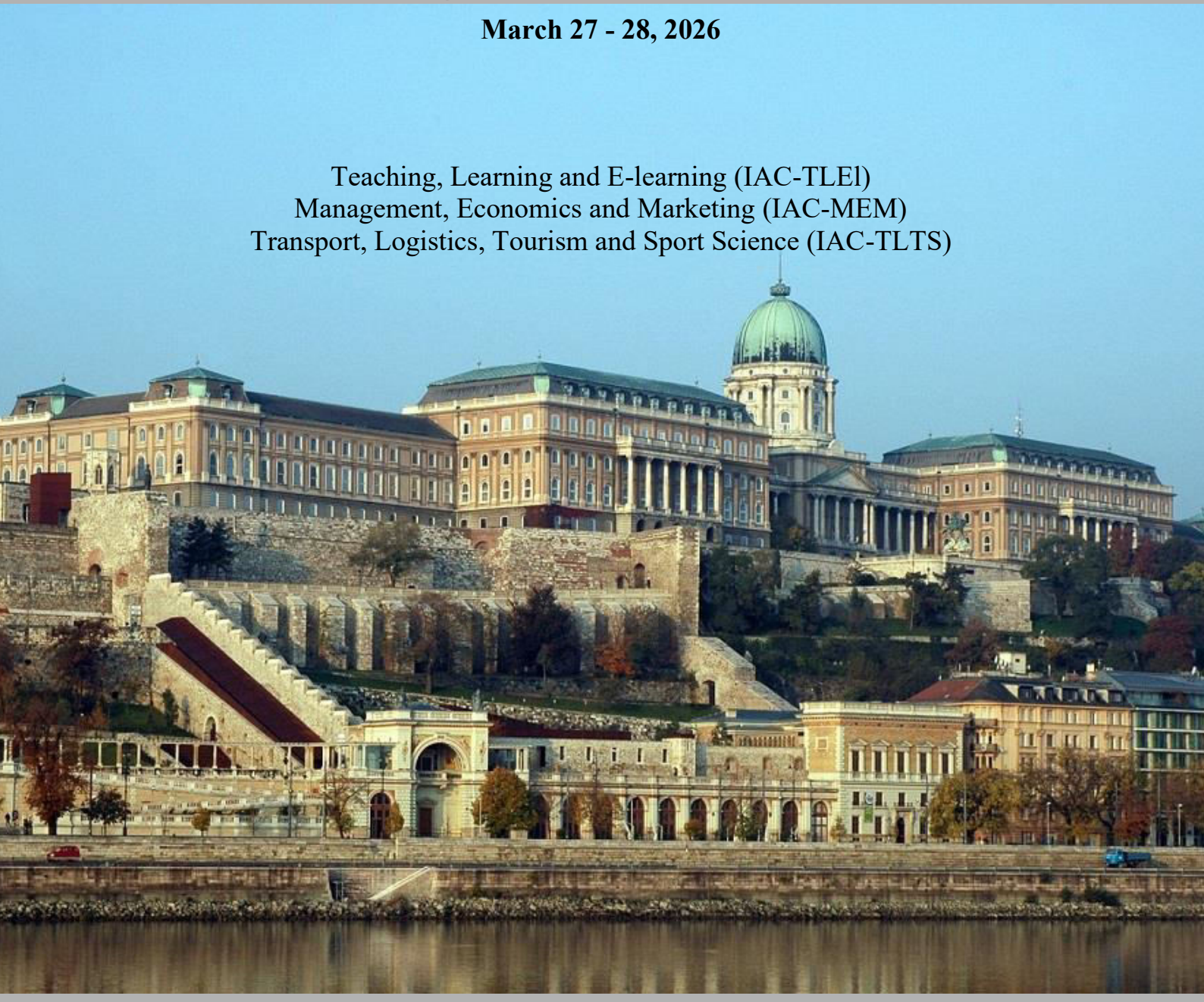

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Management, Economics and Marketing (IAC-MEM)

Unlocking Business Success: The Mediation Effect of Supplier Involvement in Green Supply Chains and Corporate Responsibility: An Empirical Study in Saudi Arabian Industrial Sector

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Abstract

The increasing focus on sustainability has led organizations across the globe to adopt green practices, specifically within supply chains. This research investigates determinants of sustainable supply chain performance in Saudi Arabia, with special referencing given to the mediating effect of green service innovation (GSI). Utilizing the Resource-Based View (RBV) as well as dynamic capabilities theory, research identifies four drivers of SSCP as being agile innovative products (AIPs), business intelligence readiness (BIR), innovative supply chain process integration (SCPI), and green supply chain agility (GSCA). A theoretical framework was constructed in order to explore how determinants influence SSCP and in what manner GSI mediates their relationship. The research is quantitative in nature using data from 239 professionals in various sectors in Saudi Arabia. Structural equation modeling (SEM) was conducted to examine hypothesized relationships. The findings suggest all four variables have a positive effect on GSI that in consequence has a significant influence on SSCP. Again, mediation roles of GSI were substantiated and most shown by ISPI on SSCP through GSI. The research adds to the literature by providing a new understanding of the mediating role of GSI within the sustainable supply chain context. The research provides practical implications for companies in Saudi Arabia, particularly in alignment with Vision 2030, as well as enunciates the importance of integrating innovation, flexibility and sustainability to achieve long term supply chain success.

Keywords: sustainable supply chain performance, green service innovation, agile innovative products, business intelligence readiness, innovative supply chain process integration, green supply chain agility.

1. INTRODUCTION

In recent years, there is a soaring global attention on sustainability, fueled by the need to fix environmental problems, economic uncertainty, and social pressures (Alkaraan et al., 2025). With scaling ecological issues, several businesses are adopting sustainable business practices in association with both regulation requirements as well as shifting consumer expectations (Ghaderi et al., 2024; Acquaye et al., 2018). This is particularly being done within

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the supply chain function, where ecological as well as social elements are being integrated into existing business models (Acquaye et al., 2018). There is rising interest in sustainable supply chain management (SSCM) driven by conservational footprint reduction, conformity with increasingly tougher legislation, as well as the maintenance of competitiveness within organizations (Moh'd Anwer, 2025). SSCM is further being highlighted as it is seen to improve efficiency, lower costs, build brands, as well as generate long-term value (Demir et al., 2023; Khammadee & Ninaroon, 2022).

In Saudi Arabia, sustainable development emphasis has been incorporated within the country's vision for 2030, a strategic framework for reorienting the country's economic framework, diversifying its oil-centric economy, and promoting sustainable growth across its non-oil sectors (Qiu et al., 2022). Vision 2030 provides a framework for the industrialization of the country, as well as the supply chain, and places specific emphasis on mainstreaming sustainability concepts within business operations (Salisu et al., 2021). The key to the success of such a vision is the development of a diversified, strong, and sustainable economy that is able to cope with evolving global situations (Sharma et al., 2024). Saudi Arabia is, under this ambitious vision, making massive investments within infrastructure, technology, as well as the role of the private sector for driving green initiatives, as well as building a competitive supply chain environment (Madkhali & Sithole, 2023; Malik et al., 2019). This has transformed the adoption of sustainable supply chain practices into not only a business need but also a core aspect of the overall economic as well as environmental vision of the Kingdom (Luthra & Mangla, 2018). For this, it is essential that one realizes the factors that can have a substantial role within improving sustainable supply chain effectiveness such as AIPs (Gunasekaran et al., 2017), BIR (Acquaye et al., 2018), SCPI (Moh'd Anwer, 2025), and GSCA (Ghaderi et al., 2024).

In addition, as demands for tailored products, shortened product lifecycles, and evolving market trends increase, businesses face pressures to sustain their performance. It motivates companies towards formulating SSCM ideas that promote operational effectiveness, balance economic needs and long-term requirements for sustainability, and promote efficiency in an environmental context. AIPs shape the ability of rapid product advent and delivery in response to market needs (Acquaye et al., 2018). The growing need for AIPs is driven by rapid technological progress, market disaggregation induced by globalization, as well as needs for flexibility in production. Companies are moving away from product research and improvement activities depicted by extensive planning, towards an agile, sustainable procedure initiated based on flexibility, resilience, as well as rapid responsiveness towards customers (Acquaye et al., 2018; Mangla et al., 2020). From research, it is seen that companies are implementing lean, resilient supply chains in order to take advantage of these type demands for competitiveness. AIPs can be executed in business through rapid response towards adapting changes in market needs, customers' choice, based on available technological advancements and innovation programs. With environmental sustainability gaining growing significance, practicing agile approach in product development can enhance the quality of supply chain processes.

Business intelligence readiness is the capacity of an industry to leverage information systems as well as analytics with the purpose of developing decision-making practices throughout the supply chain (Acquaye et al., 2018).To efficiently accomplish their goals, organizations must ensure they have adequate BIR, especially for their operational activities as well as logistical operations. This makes companies able to maximize existing resources as well as project demands for the future, allowing for rapid responsiveness as well as adaptability for shifting market demands. Companies that have a sustainable approach incorporated within their supply chain are able to prevent interruptions as well as ensure continuous flow of materials, promoting operational effectiveness and innovation. BIR captures the ability of a company to consistently offer specialized software for analysis of the company's data, develop dependable infrastructure for the company's data with current IT systems, is dependent on quality information on all levels, as well as utilizing competent professionals who have expertise on big data analytics. These help the company maximize its current chain of supply as well as reduce the inefficiency of decision-making (Acquaye et al., 2018; Lim & Teoh, 2020). There have only been previous research that have emphasized theoretical concepts of BIR, with not much empirical research conducted (Ahmad et al., 2021; Tjahjadi et al., 2023). For the country of the Middle East, Saudi Arabia, research under the framework of Vision 2030 is notably scarce. Vision 2030 emphasizes digital transformation and sustainable economic development, highlighting the need for advanced business intelligence systems to enhance operational efficiency within the region.

Innovative Supply Chain Process Integration refers to the extent to which companies integrate innovative and eco-friendly processes within their supply chains to enhance efficiency, responsiveness, and sustainability. It encompasses collaboration throughout the entire supply chain from raw materials acquisition through final product delivery, while prioritizing environmental as well as social objectives (Yousefi & Tosarkani, 2024; Lim & Teoh, 2020). Companies that adopt it change processes in an effort to produce sustainable goods and services, continually come up with means of developing innovative sustainable products and encourage workers' involvement in regular

meetings on improving product innovation (Waqas et al., 2022). The companies also encourage innovation in means of mitigating pollution in a bid to reduce waste in resources and ensure increased efficiency through incorporating new processes while reducing negative environmental impacts (Shahid et al., 2020). In Saudi Arabia where Vision 2030 promotes sustainable development, studies on integrating it help companies align themselves with national agendas, optimize resources, and come up with environmentally friendly means of sustainable long-term growth in a dynamic market.

Green supply chain agility is the ability of a company to make swift alterations in its supply chain operations for sustainable goals in response to dynamic market forces and customers' requirements (Ghaderi et al., 2024). The ability to quickly respond to changing green market forces, including alterations in customers' demand for sustainable products, and modify operations accordingly while not compromising on green objectives is included. The ones that have strong GSCA have mechanisms and processes in place for responding to changing customer demands while staying within sustainability priorities (Yousefi & Tosarkani, 2024; Lim & Teoh, 2020). GSCA is something that must be researched because it assists businesses in remaining competitive in an environment in which sustainability is becoming more important. For regions such as Saudi Arabia, where sustainability is foundational in the plans of Vision 2030, studying how businesses can react fast to green marketplace requirements is important for achieving long-term profits.

Sustainable supply chain performance is an analysis of the overall supply chain performance in relation to environmental, social, as well as economic sustainability (Moh'd Anwer, 2025). The SSCP is far larger in scope in contrast with the traditional supply chain performance, efficiency, cost, as well as responsiveness based measures. SSCP, in contrast, integrates environmental with social performance in the overall measure of the supply chain activities, thereby being focused on business activities with an environmentally holistic impact (Moh'd Anwer, 2025; Mangla et al., 2020; Whitelock, 2019). The SSCP measures the extent to which business optimizes its supply chain such that its activities can guarantee long-term economic, social, as well as environmental sustainability. Examples of such measurements include having visibility of supply chain dynamics, proactive management of risks in order not to disrupt, reducing waste generated from operations, as well as compliance with environmental standards driven by customers' requirements. SSCP is realized through the optimization of resources, waste minimization, as well as energy efficiency, supported with green processes as well as technology (Zaid et al., 2018; Rehman Khan et al., 2022).

When examining the drivers of sustainable supply chain performance, RBV offers an intriguing framework. Drawing from the RBV, competitive advantage stems from a firm's capability for efficient deployment of valuable, rare, and inimitable resources (Hart & Dowell, 2011). Agile innovative products, business intelligence readiness, as well as innovative integration of supply chain processes in the context of this work, can be treated as salient resources in supporting the sustainability of a firm. Additionally, GSI is imperative for enabling firms to mobilize such resources in achieving supply chain performance excellence (Hariadi et al., 2023). With integration of green innovations within the value chain, not only is the increasing customer demand for sustainable products met, but firms are also given a competitive edge (Yousefi & Tosarkani, 2024). The resultant approach is compatible with the increasing emphasis on sustainability in global markets, with reference to Saudi Arabia, where Vision 2030 alludes to adopting sustainable, environment-friendly, as well as quality-driven operating methods. RBV, underpinned by dynamic capabilities, highlights innovation as strategically crucial for sustainable achievement.

Green service innovation is one in which new processes or services are developed, implemented, to minimize environmental footprint (Chen et al., 2015). This involves redesigning products or services that are already in place with a focus on sustainability, expansion of the mix of services or products that are environmentally oriented, and addition of product lines and buyer patterns that are environmentally friendly. They are characterized by low-energy consumption technologies, green materials as well as circular economy principles, with focus on recycling and reducing waste in the supply chain (Dong et al., 2023).

The growth of GSI is also driven by digital technologies as well as business intelligence platforms such as artificial intelligence (AI), big data analysis, as well as the Internet of Things (IoT). These technologies provide access to knowledge to an extent never heard of with the objective of enhancing supply chain performance as well as reducing environmental footprints (Ahmad et al., 2021). GSI is central in helping businesses attain SSCP since it allows them to respond to customer demands for green innovations, minimize waste as well as lessen consumption of power. Institute such innovations not only contribute to the improvement of business environmental responsibility, but it also enhances its competitiveness within the increasingly sustainability-focused market (Khan et al., 2022; Sun & Sun, 2021). Further research is, however, necessary on how such innovations help enhance Saudi Arabian supply chain performance, given the country's characteristic cultural, economic, as well as legal environment.

Most of the studies previously identified within the available literature on SSCP have targeted industrialized as well as developed nations (Mangla et al., 2020; Acquaye et al., 2018), with few such studies being conducted within developing nations that need empirical evidence within emergent economies like Saudi Arabia (Al-Husain et al., 2024). Also, the existing research studies have studied different determinants of SSCP (Ghaderi et al., 2024; Acquaye et al., 2018; Moh'd Anwer, 2025; Mangla et al., 2020; Khan et al., 2022; Al-Husain et al., 2024), but there is a gap in the literature regarding a comprehensive analysis of the determinants. Moreover, there is a crucial role of GSI in impacting SSCP (Sun & Sun, 2021; Dong et al., 2023; Ahmad et al., 2021; Chen et al., 2015), which has not been sufficiently considered in existing studies, requiring the attention of researchers (Khanra et al., 2022; Hariadi et al., 2023).

Considering the gaps in literature, this study has several key contributions. It first examines the influences on Saudi Arabian SSCP with a focus on the mediation role of green service innovation. It then explores how business intelligence readiness, agile innovative products, and integrating innovative supply chain processes drive GSI and presents a comprehensive picture of their interlinks within the context of SSCM. Additionally, this paper offers valuable insights for organizations in Saudi Arabia, particularly in alignment with the nation's Vision 2030, by proposing strategies to enhance SSCP through effective green service innovations. Given the limited research on the mediating role of green service innovation, this study redefines and deepens the understanding of how innovation and integration processes can drive sustainable performance in supply chains, contributing to both environmental and operational excellence in various industries.

The aim of this study is to explore the determinants of SSCP in Saudi Arabia, focusing specifically on the mediating role of green service innovation. This research will address the following key questions:

1. What are the key determinants influencing SSCP in Saudi Arabia?

2. What is the role of GSI in mediating in various industries in Saudi Arabia?

The structure of the article is as follows: Section 2 reviews the relevant literature and develops research hypotheses, Section 3 outlines the methodology, including data collection and analysis techniques, Section 4 presents the findings, and Section 5 discusses the implications. Finally, Section 6 concludes the study with contributions, limitations, and future research directions.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. Agile Innovative Products and SSCP

The entry of AIPs into SSCM is the research focus that has gained increasing visibility in recent years. As businesses adapt to mounting calls for sustainability in addition to changing market drivers, business development flexibility emerges as key. AIPs (Ability in Product) is an attribute used to describe the capacity of businesses in developing and bringing out their products rapidly in line with market requirements, with emphasis placed on adaptability, speed, and innovation in reaction to altered consumption patterns (Acquaye et al., 2018).

AIPs have found increased importance in the sustainability agenda because they ensure adaptability and innovation in complex supply chains. Contrary to established models, AIPs facilitate quick iterations and collaborative co-creation of stakeholders, leading to adaptive, sustainable supply chains (Moh'd Anwer, 2025). Agile innovation enhances traceability, modularity, and digitalization, features that are necessary for sustainability reporting as well as for decarbonization programs (Demir et al., 2023). By integrating environmental considerations in the early stages of product development, AIPs enable suppliers to practice eco-design as well as circular economic practices. They encourage innovation as well as collaboration, helping businesses meet ESG requirements, which are of increasing concern to regulators as well as investors (Salisu et al., 2021).

AIPs, therefore, deliver strategic value through maximum SSCP beyond incremental operating enhancements. SSCP is the capacity of supply chains for achieving economic, environmental as well as social goals in an integrated and balanced way. SSCP is vital for improving operational performance, minimizing environmental degradation, as well as ensuring long-term business resilience in the presence of changing regulatory as well as marketplace demands (Khammadee & Ninaroon, 2022).

The direct impact of AIPs in SSCP has been highlighted through extensive research with special attention being laid on how they contribute to increasing business operational effectiveness, minimizing environmental footprints, as well as customer satisfaction (Moh'd Anwer, 2025; Demir et al., 2023). Through the application of agile

practices, companies have the capability to easily adapt to market conditions as well as to the needs of regulations, which in turn supports long-term sustainability (Khammadee & Ninaroon, 2022).

Through the embracement of AIPs in the supply chain, the capability of companies to achieve environmental as well as social targets in sustainability is enhanced (Qiu et al., 2022). Business enterprises, for example, utilizing agile methods for developing products have the capability of producing sustainable products that balance customer as well as environmental requirements (Salisu et al., 2021). Moreover, interconnection of AIPs facilitates the development of lean value chains through elimination of waste, power usage, as well as unnecessary use of resources (Sharma et al., 2024).

Others, however, believe that the integration of AIPs can create short-term turmoil in addition to increased costs, with the likelihood of a negative impact on performance (Wiesche, 2021; Bi et al., 2023). The use of agile practices might unleash complexity in supply chain management, affecting quality of the product, as well as increasing operational costs, particularly in industries with limited flexibility as well as limited resources (Salisu et al., 2021; Sharma et al., 2024).

Quick development cycles could further contribute to supply chain inefficiencies as well as environmental trade-offs that undermine long-term sustainability (Madkhali & Sithole, 2023). These issues could also cause problems in sustaining consistent product quality as well as managing the risks of the supply chain, especially where companies are under pressure to cope with changing customer demands without accounting for long-term operating as well as environmental effects.

Modern companies with operations in unstable global markets use AIPs not only for speed of execution but for infusing product development pipelines with environmental responsiveness as well as ethical sourcing (Salisu et al., 2021). Agile methodologies, including Scrum and Kanban, applied to supply chain innovation, provide continuous loops of feedback from customers, regulators, as well as partners, allowing for speedier inclusion of sustainability metrics within design, production, as well as logistics (Moh'd Anwer, 2025). Additionally, the iterative nature of agile product development encourages risk reduction in allocating resources, as companies can test and scale up low-impact alternatives before substantial upfront environmental costs are incurred (Bi et al., 2023). This adaptive capability not only encourages green innovation but also helps build resilience for supply chains based on predictive analytics, modular flexibility, as well as decentralized decision-making, which contributes to long-term sustainability performance (Acquaye et al., 2018; Bi et al., 2023). It is, therefore, hypothesized that:

H1: AIPs have a positive impact on sustainable supply chain performance.

2.2. Innovative Supply Chain Process Integration and SSCP

SCPI has emerged as a critical enabler of sustainable supply chain management, particularly in the face of mounting pressures to align operational practices with environmental and social responsibilities. SCPI refers to the coordinated integration of advanced, eco-conscious, and technology-driven processes across all supply chain stages, aimed at improving responsiveness, efficiency, and sustainability (Yousefi & Tosarkani, 2024). In contrast to traditional supply chain models, SCPI not only focuses on functional alignment but also on innovation embedded in day-to-day operations, from environmentally friendly production processes and sourcing methods through digitized distribution and reverse-logistics systems (Shahid et al., 2020).

SCPI converts conventional supply chains into open, dynamic, and ecologically friendly network structures, optimizing material flow and minimizing wastage through real-time data and green design (Shahid et al., 2020). With new integration processes of modular manufacture, just-in-time green delivery, and artificial intelligence-based forecasting, firms attain a strategic edge in ecologically friendly tracking and efficient service delivery (Zaid et al., 2018). These processes attain decreases in energy use, water use, and carbon footprint, core dimensions of SSCP (Waqas et al., 2022; Govindan et al., 2020).

Literature has revealed SCPI as being pivotal in enabling enhanced performance for the supply chain through end-to-end visibility, reduction of bottlenecks, as well as mutual decision-making for sustainability purposes (Shahid et al., 2020; Govindan et al., 2020; Mangla et al., 2020). Integrated and innovative supply systems in firms are likely to acquire sustainability certification, environmental policy compliance, as well as ecologically driven consumer requirements (Shahid et al., 2020). Technological integration as well as process innovation are also seen to propel green product life cycle management as well as efficient-run operations directly responsible for outcome of SSCP results (Rehman Khan et al., 2022; Lee et al., 2025).

Yet some studies indicate that SCPI can prove problematic, primarily if innovation interferes with entrenched processes or cross-functionality co-ordination is non-existent (Shahid et al., 2020). The alignment of complexity in bundling new processes with supply chain partners and the cost of digitisation can often undermine short-term

payback and even scalability at times (Shahid et al., 2020). Furthermore, inconsistencies between environmental objectives and operational KPIs inhibit adoption of sustainable methods, particularly where resources are limited or highly regulated industries are involved (Hariadi et al., 2023).

Given these constraints, SCPI in the long term has immense advantages for sustainable performance. An example is Saudi Arabia, where pressure for digitalization under Vision 2030 runs concurrently with pressure for sustainability and SCPI is one means through which companies can achieve national objectives while ensuring competitive supply chain practice (Lee et al., 2025; Govindan et al., 2020). Companies infuse innovation in supply chain integration not just for regulation purposes but also increase responsiveness, resilience, and long-term environmental stewardship (Wu et al., 2023). On these premises, it is theorized that:

H2: SCPI has a positive impact on sustainable supply chain performance.

2.3. Business Intelligence Readiness and SSCP

BIR is one of the main drivers of the SSCP, especially since firms are increasingly being pushed towards utilizing data-based insights to optimize supply chain operations. A firm's readiness in accepting and integrating business intelligence (BI) tools, methods, and procedures for capability building in making decisions, minimizing operating costs, and meeting needs for sustainability (Ahmad et al., 2021) is often termed as BIR. With increased global supply chain complexity and the need for meeting environmental, social, and economic priorities due to global concerns about climate change and sustainable business operations, the function of BIR in attaining sustainability has received large amounts of attention (Tjahjadi et al., 2023).

Implementation of BI systems in supply chains allows companies to examine large amounts of information, thus being able to offer visibility, enhance resource allocation, and identify wastage and inefficiencies in the supply chain (Yousefi & Tosarkani, 2024). High levels of BIR allow businesses to make accurate demand projections, manage inventory more effectively, as well as make processes in logistics smoother, all of which are necessary for SSCP achievement (Tjahjadi et al., 2023). Additionally, BIR enables firms to include green processes as well as environment as well as sustainability indicators in processes, thus allowing companies to compare business processes against green benchmarks as well as regulation (Shahid et al., 2020). Utilizing predictive analytics as well as continuous monitoring of real-time data allows businesses to effectively capture as well as mitigate environmental impact risks, thus making processes smoother in general for their overall sustainability performance (Khanra et al., 2022).

Studies reveal that firms with effective BIR systems can leverage the data from BI tools to achieve green operations, such as lower carbon emissions, optimized energy consumption, and less waste (Lim & Teoh, 2020). For instance, firms leveraging advanced BI systems can monitor the environmental reputation of suppliers, identify areas of inefficiencies, and align with allies to increase sustainability success along the supply chains (Chen et al., 2015). In addition, through the implementation of lean as well as agile value chain practices, it is possible through BIR to accomplish economic as well as environmental sustainability goals (Hart & Dowell, 2011).

However, while the potential of using BIR for SSCP is apparent, there are challenges to its implementation. Effective adoption of BI systems demands substantial investments in infrastructure, training, as well as managing the data, a challenge for organizations, especially those from developing markets (Tjahjadi et al., 2023). Second, integrating the implementation of BIR within established supply chain processes can demand a shift of culture within organizations, where employees, as well as managers, will need to embrace a decision-making and sustainability management approach that is based on information (Hariadi et al., 2023). Furthermore, the precision as well as dependability of data significantly determine the efficiency of BI systems in driving sustainable supply chain performances. Incomplete, as well as incorrect, data can invalidate the efficiency of the implementation of BIR and make it impossible for a company to realize its sustainability aims (Khanra et al., 2022).

Notwithstanding such challenges, strategic alignment of BIR with the operations of the supply chain has emerged as a prime driver of sustainable supply chain effectiveness. In Saudi Arabia, for example, where Vision 2030 calls for digital transformation coupled with sustainable economic growth, BIR is becoming a critical driver of operational efficiency as well as environmental stewardship (Malik et al., 2019). Companies who make investments in BIR and build the appropriate capabilities for utilizing BI tools are well-placed to adapt to market pressures for sustainable goods, enhance supply chain resilience, as well as comply with changing environmental legislation (Hariadi et al., 2023). Hence, it is hypothesized that:

H3: BIR has a positive impact on sustainable supply chain performance.

2.4. Green Supply Chain Agility and SSCP

GSCA is one of the essential contributors for improving SSCP as companies face mounting market uncertainty, evolving consumer needs, and demands for environmentally friendly practices. GSCA is defined as an organization's capacity to effectively and speedily address environmental issues, customers' demands for green products, as well as fluctuations in market situations while not compromising its sustainability aspirations (Ghaderi et al., 2024). It is a combination of the philosophies of agility, such as responsiveness as well as flexibility, combined with a strong commitment to sustainability, so that businesses can efficiently react to varying green market demands while maintaining competitive supply chain efficiency (Yousefi & Tosarkani, 2024).

The primary strategic advantage of GSCA is the ability of companies to quickly align the procedures as well as functions according to changing needs for sustainability. For instance, high-score companies in the environmental level of the GSCA can align the sourcing, manufacturing, as well as distribution processes according to changing environmental policies or the needs for green products by the customers (Lim & Teoh, 2020). Flexibility enables companies to ensure consistency within the chain, as well as efficacy, since companies ensure standards of the environment are not only achieved but also exceeded.

Also, supply chain resilience is enhanced by GSCA through the capacity of companies to address disruptions such as natural disasters, regulator changes, and shortage of supply promptly while minimizing adverse impacts on the environment (Moh'd Anwer, 2025; Mangla et al., 2020). Recent research has proven the function of GSCA in SSCP through its role in enabling green strategies in supply chain operations. To illustrate, companies involving themselves in greenness in supply chain operations are optimally capable of managing climate change supply chain risks, resource shortage risks, or environmental emergency risks (Zaid et al., 2018; Rehman Khan et al., 2022).

GSCA enables companies to optimize resource utilization, reduce wastages, and take advantage of renewable energy sources in conducting business and making contributions towards environmental performance for sustainable performance (Hariadi et al., 2023). High-GSCA companies are in an even good position to promote circular economic concepts such as reuse of material, recycling, and reducing the rate of carbon emissions as key components of SSCP (Waqas et al., 2022). Conducting GSCA is not seamless, though. Organisations can hardly balance flexibility and sustainability, especially where swift changes within supply chains have higher environmental compromises (Cantele et al., 2023).

To adapt as quickly as possible, suboptimal environmental effects, such as higher transportation emissions or greater energy consumption during times of supply chain adjustments, can occur. In addition, the implementation of GSCA demands hefty investments in green technologies, for example, green logistics, as well as eco-efficient production systems, with a potentially high demand on resources (Waqas et al., 2022; Cantele et al., 2023). Despite the short-term challenges, the long-term advantages of GSCA, especially in terms of higher operational flexibility and greater sustainability, prevail.

In Saudi Arabia, where sustainability is a prime aspect of Vision 2030, GSCA plays an essential role in aligning with national sustainability objectives as well as competitiveness within international markets (Lim & Teoh, 2020; Ghaderi et al., 2024). Through the implementation of green as well as agile supply chains, organizations can not only comply with regulatory needs, but they can create trust as well as loyalty from customers, ultimately driving SSCP over the long term. Hence, it is postulated that:

H4: GSCA has a positive impact on sustainable supply chain performance.

2.5. GSI as a Mediator in the Relationship between Determinants and SSCP

GSI is defined as the implementation or intervention of environmentally sustainable-inclined services that enable organizations to minimize their ecological impact while enhancing operating effectiveness (Khan et al., 2022). By mediating, GSI makes sure that sustainability pervades the entire supply chain, connecting innovation with improving green long-term performance.

Since companies are increasingly experiencing regulatory and market pressures to be sustainable, GSI offers a key route for green practices being implemented across service functions, including logistics, customer service, and product delivery. Green service innovations help organizations improve efficiency and reduce resource use, directly supporting SSCP (Sun & Sun, 2021). GSI contributes directly to SSCP by promoting sustainability through service-led innovations. It has been established through research that organizations that adopt GSI programs, such as renewable energy services, waste reduction initiatives, and eco-effective logistics, realize enhanced environmental performance as well as cost savings (Dong et al., 2023). Implementing green service practices enables companies to decrease their carbon footprints as well as enhance the efficiency of their resources, both of which are fundamental

aspects of SSCP (Khanra et al., 2022). GSI helps ensure SSCP by providing that sustainability is incorporated within all service-delivery aspects, allowing organizations to comply with environmental legislation, improve customer satisfaction, and attain competitive benefits from sustainable practices (Ahmad et al., 2021). Based on the above, the following association has been postulated:

H5: GSI positively impacts sustainable supply chain performance.

AIPs make organizations agile enough to respond quickly to market changes as well as consumers' requirements. Yet, for AIPs to effectively improve SSCP, they have to adopt greenness through green design principles as well as green production. To mediate the interaction, AIPs have to integrate green considerations such as eco-design as well as leaner use of resources (Chen et al., 2015). This makes AIPs improve not only the efficiency of operations but also sustainability, hence enhancing SSCP. By integrating GSI within agile product development, organizations can not only innovate fast but also minimize the impacts on the environment, thus improving SSCP (Dong et al., 2023).

H6: GSI mediates the relationship between agile innovative products and sustainable supply chain performance.

BIR provides companies with the capabilities and tools necessary for making optimal supply chain choices through data analytics. GSI acts as a facilitator of such a process by making sure that the knowledge derived from BI systems is translated into initiatives for sustainability. For instance, BI can reveal wastage or inefficient energy consumption, whereas GSI can trigger the application of green service innovations, e.g., green service concepts or green logistics, in response to such information (Acquaye et al., 2018; Macklin, 2024). With the application of GSI, firms are able to convert decision-making on data into green activities, therefore maximizing SSCP through addressing both operating efficiency as well as environmental sustainability (Macklin, 2024; Rashid et al., 2025).

H7: GSI mediates the relationship between BIR and sustainable supply chain performance.

SCPI entails coordinating different activities of the supply chain with the help of advanced technologies and eco-effective practices. GSI facilitates the role of being an intermediary by incorporating sustainability into support service processes for SCPI so that green strategies are practiced right from each step of the supply chain (Khan et al., 2022; Sun & Sun, 2021). For example, incorporating GSI into logistics or customer service processes can reduce wastage as well as cut down energy usage, which can directly improve SSCP. SCPI, through GSI, makes the supply chain sustainable as well as efficient, allowing companies not only to realize their green goals but also remain competitive (Macklin, 2024; Rashid et al., 2025).

H8: GSI mediates the relationship between SCPI and sustainable supply chain performance.

GSCA helps organizations make their supply chain operations adapt quickly based on the needs of a fast-moving market, particularly in reaction to environmental changes, as well as customers' demands for green products. The mediator for such is GSI by incorporating green service innovations within agile supply chain operations. For instance, embracing renewable energy sources for transportation as well as utilizing environmentally conscious service delivery models help organizations adapt while achieving sustainability goals (Yousefi & Tosarkani, 2024; Shahid et al., 2020). In turn, GSI reinforces the role of GSCA in promoting SSCP by instituting green practices within any agile reaction so that the entire chain is sustainable (Waqas et al., 2022; Shahid et al., 2020; Hariadi et al., 2023).

H9: GSI mediates the relationship between GSCA and sustainable supply chain performance.

3. THEORETICAL FRAMEWORK

After presenting the theoretical foundation and prior literature on sustainable supply chain determinants and green service innovation, this paper proposes a comprehensive model. It identifies AIPs, SCPI, BIR, and GSCA as independent variables influencing SSCP. Furthermore, the model expects GSI to mediate the relationships between the determinants and SSCP.

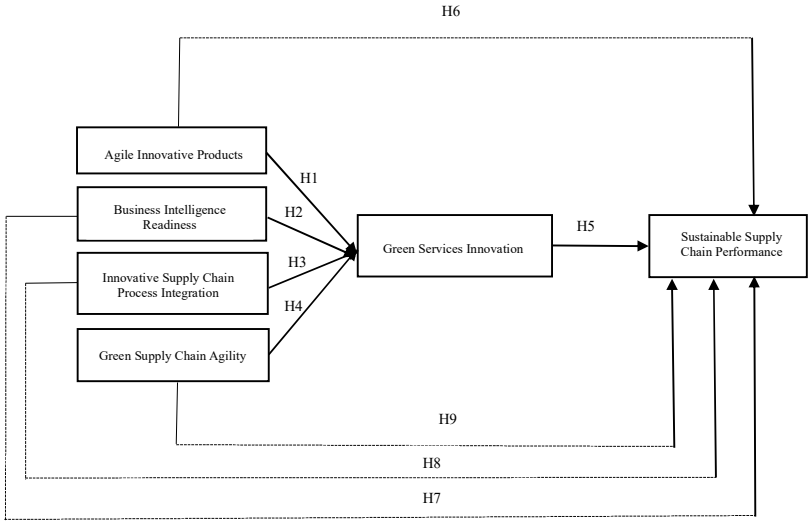

Fig. 1. Theoretical Framework

4. DATA COLLECTION AND METHODOLOGY

To empirically investigate the hypothesized relationships within the proposed conceptual framework, data were collected through a structured, self-administered questionnaire disseminated electronically to professionals in logistics, manufacturing, and service-based industries across the Kingdom of Saudi Arabia. The survey targeted individuals occupying roles related to operations, supply chain management, and sustainability, ensuring informed responses on themes of innovation and green practices within supply chains.

The questionnaire was constructed using well-established measurement instruments sourced from relevant academic literature, thereby securing both content and construct validity. Constructs such as AIPs, BIR, SCPI, GSCA, GSI, and SSCP were operationalized using multi-item scales adapted to the Saudi industrial context.

An initial pool of responses was obtained from 239 participants. Following comprehensive data cleaning procedures examining all cases, a total of 238 valid responses were retained after 1 participant decided to disagree to our consent form. This sample size was considered adequate for (SEM, particularly given the model's structural complexity. In accordance with Kline (2016), a sample exceeding 200 is deemed sufficient for reliable parameter estimation in models of moderate-to-high complexity. Refer to figure 1 for demographic details related to age distribution, gender, sector, years of experience, and firm size.

4.1. Measurement of Variables

To ensure the reliability and validity of the construct measurements, previously validated scales from the literature were employed, with necessary contextual adjustments. All items were administered in English, which remains the formal language for business communication in Saudi Arabia. The survey incorporated a total of 26 items across six constructs, each measured on a five-point Likert scale ranging from 1 (“Strongly disagree”) to 5 (“Strongly agree”). Table 1 summarizes the psychometric properties of the constructs, including Cronbach's alpha (α), Composite Reliability (CR), Average Variance Extracted (AVE), and standardized factor loadings.

Table 1. Measures and Confirmatory Factor Analysis

Variables	Reference	Cronbach's α	CR	AVE	Std. Factor Loading
Agile Innovative Product AIPs1 – AIPs4	Moh'd Anwer, 2025	0.90	0.91	0.71	0.76 - 0.88
Business Intelligence Readiness BIR1 - BIR4	Moh'd Anwer, 2025	0.89	0.89	0.68	0.80 - 0.87
Innovative Supply Chain Process Integration ISC1 - ISC4	Zhu et al., 2008	0.83	0.82	0.53	0.66 - 0.78
Green Supply Chain Agility GSC1 - GSC5	Ghaderi et al., 2024	0.89	0.88	0.59	0.73 - 0.82
Sustainable Supply Chain Performance SSCP1 - SSCP5	Bag et al., 2020	0.81	0.83	0.55	0.65 - 0.80
Green Service Innovation GSI1 - GSI4	Zhu et al., 2008	0.91	0.91	0.71	0.78 - 0.88

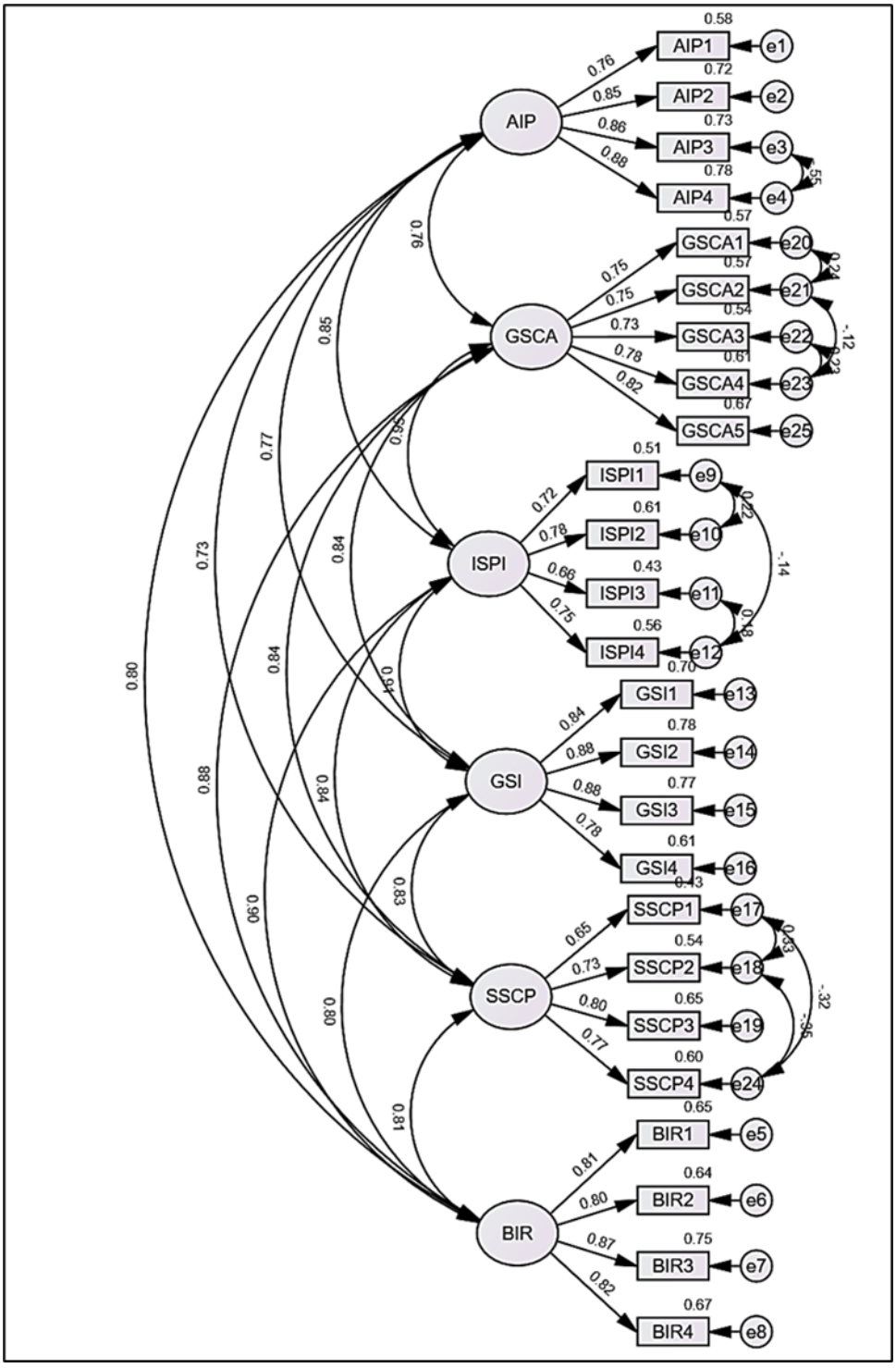

Fig. 2. Measurement Model

- AIPs: Measured via four items adapted from Moh'd Anwer (2025), with CR = 0.91, AVE = 0.71, and factor loadings ranging from 0.76 to 0.88.
- BIR: Four items drawn from Moh'd Anwer (2025), CR = 0.89, AVE = 0.68, with loadings between 0.80 and 0.87.
- SCP): Based on Zhu et al. (2008), this construct was measured using four items (CR = 0.82, AVE = 0.53), with standardized loadings between 0.66 and 0.78.
- GSCA: Five items were used, adapted from Ghaderi et al. (2024), with CR = 0.88, AVE = 0.59, and loadings between 0.73 and 0.82.
- GSI: Measured through four items derived from Zhu et al. (2008), CR = 0.91, AVE = 0.71, with high factor loadings (0.78–0.88).
- SSCP: Based on Bag et al. (2020), five items were used, yielding CR = 0.83, AVE = 0.55, and loadings between 0.65 and 0.80.

4.2. Data Validity and Reliability

The hypothesized structural model was evaluated using SEM via IBM AMOS (v.29), employing the two-step modeling procedure proposed by Anderson and Gerbing (1988). Confirmatory Factor Analysis (CFA) was first conducted to verify the measurement model. All constructs demonstrated satisfactory levels of convergent validity and composite reliability.

Goodness-of-fit indices indicated an acceptable model fit (see Table 2): RMSEA = 0.063, TLI = 0.938, CFI = 0.944, and RMR = 0.036 were within ideal thresholds. Although the Goodness-of-Fit Index (GFI = 0.861) fell slightly below the 0.90 benchmark, this is often attributed to the sensitivity of GFI to sample size and model complexity. The chi-square to degrees of freedom ratio (CMIN/DF = 1.95) was well within the acceptable range (Wheaton et al., 1977), indicating a reasonable model-to-data fit.

Table 2. Goodness of Fit Index of the Model

GOFI	GOFI Criteria	Results	Interpretation
RMSEA	≤ 0.08	0.063	Good fit
TLI	≥ 0.90	0.938	Good fit
CFI	≥ 0.90	0.944	Good fit
GFI	≥ 0.90	0.861	Marginal fit
RMR	≤ 0.08	0.036	Good fit

4.3. Common Method Bias

Given the reliance on self-reported data obtained via a single instrument, the potential for common method bias (CMB) was assessed using Harman's single-factor test. Principal axis factoring on the 25 measurement items revealed that the first factor accounted for 48% of the total variance. This is below the critical threshold of 50%, suggesting that a single factor does not dominate the covariance structure.

While this test is diagnostic rather than definitive (Podsakoff et al., 2003), the results provide no indication of severe CMB. Additionally, the theoretical distinctiveness of constructs, as well as their origin from independent literature sources, further mitigates concerns related to common method variance.

5. RESULTS

The demographic profile indicates that the majority of the participants were male (92.1%), indicating a strong gender imbalance, with only 7.9% female representation. The workforce was relatively young, as 46.9% were aged 30–39 and 38.1% were under 30 years of age. As for the education, most participants held a bachelor's degree (82%), while 11.3% had a master's and 1.3% a doctorate, reflecting a highly educated group. In terms of organizational roles, 48.5% were in low management, 45.2% in middle management, and only 5.9% held high-level positions.

The most representative industry was healthcare (28.9%), followed by oil & gas (16.3%) and industrial services (15.1%). Experience ranged from 31.8% with a history of 1–5 years, 27.2% with a history of 6–10 years, and 19.2% with a history of more than 15 years. Most respondents (54%) were from organizations employing more than 249 individuals, whereas firms with fewer than 49 employees accounted for 23.4%, and 22.6% of respondents were from medium-sized firms, indicating a widespread distribution across organizations.

SEM with bootstrapping (5,000 resamples, 95% confidence interval) was conducted to test the hypothesized relationships. Table 3 outlines the direct and indirect effects and figure 4 visualizes the results

Table 3. Path Estimates

Observed variables	Direct Effect	Indirect effect	*p*
AIPs → GSI	0.186	-	0.018
BIR → GSI	0.148	-	0.018
SCPI → GSI	0.563	-	0.010
GSCA → GSI	0.304	-	0.010
GSI → SSCP	0.612	-	0.018
AIPs → GSI → SSCP	-	0.114	0.018
BIR → GSI → SSCP	-	0.090	0.019
SCPI → GSI → SSCP	-	0.345	0.010
GSCA→ GSI → SSCP	-	0.186	0.010

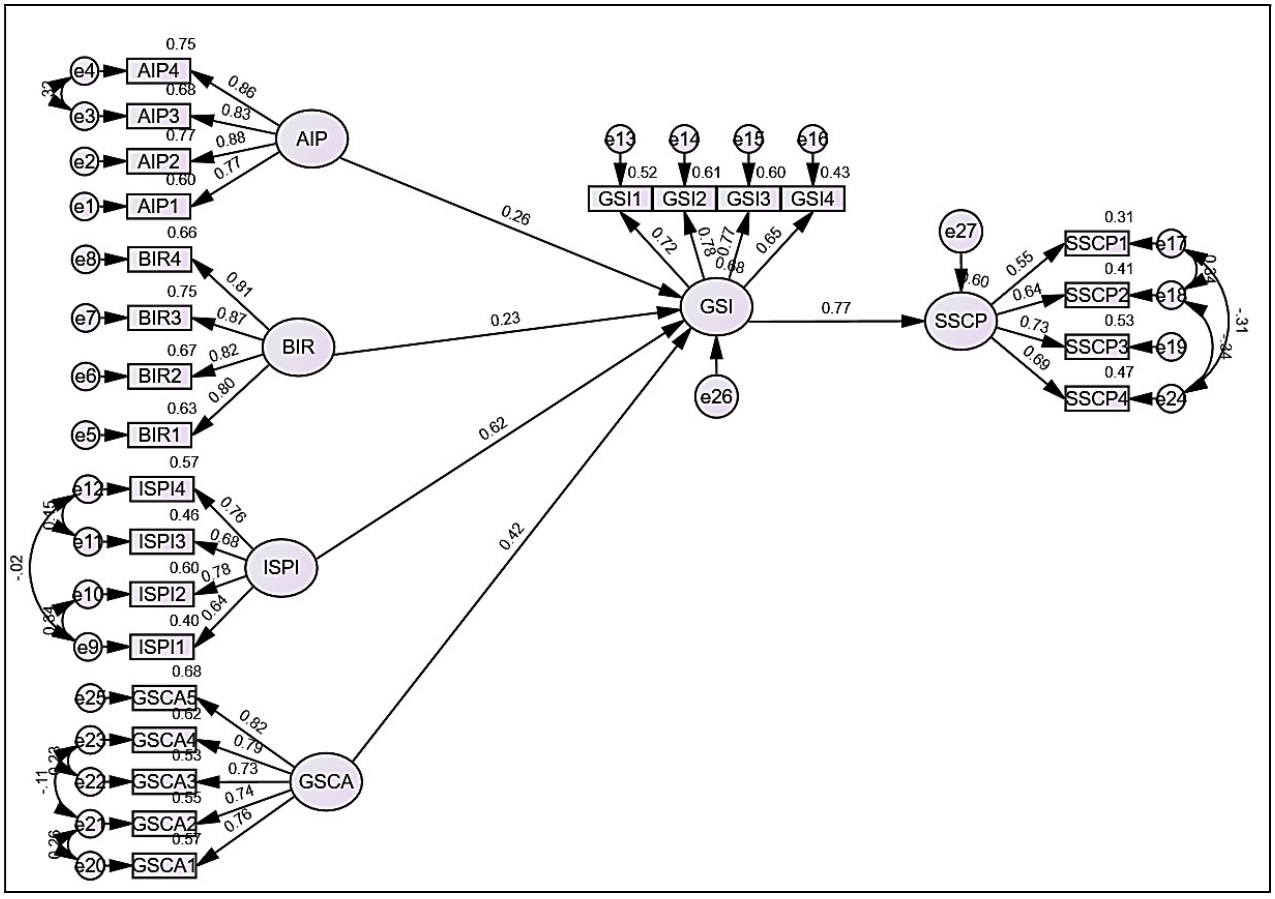

Fig. 3. Structural paths

5.1. Hypothesis Testing and Structural Path Results

H1: AIPs → GSI: Supported. (β = 0.186, p = 0.018). Agile product development positively influences green innovation in services.
H2: BIR → GSI: Supported. (β = 0.148, p = 0.018). Organizations with high data readiness are more capable of executing environmentally conscious service innovation.
H3: SCPI → GSI: Supported. (β = 0.563, p = 0.010). Integration of innovative processes enhances GSI substantially.
H4: GSCA → GSI: Supported. (β = 0.304, p = 0.010). Supply chain responsiveness and adaptability contribute to eco-innovation.
H5: GSI → SSCP: Supported. (β = 0.612, p = 0.018). Green innovation in services significantly improves supply chain sustainability outcomes.
Mediation Effects:
H6: AIPs → GSI → SSCP: Supported. Indirect effect (β = 0.114, p = 0.018).
H7: BIR → GSI → SSCP: Supported. Indirect effect (β = 0.090, p = 0.019).
H8: SCPI → GSI → SSCP: Supported. Indirect effect (β = 0.345, p = 0.010).
H9: GSCA → GSI → SSCP: Supported. Indirect effect (β = 0.186, p = 0.010).

These findings affirm the pivotal mediating role of GSIin translating enablers such as innovation, agility, and data readiness into improved sustainable supply chain performance. Particularly, SCPI demonstrated the strongest direct and mediated effects on GSI and SSCP, underscoring the importance of process innovation in achieving sustainability outcomes.

Results provide empirical support for a theoretical model that integrates innovation, agility, and intelligence readiness as key determinants of GSI and SSC in the Saudi context. The findings highlight the critical role of GSI as a mediating mechanism that enables organizations to convert internal capabilities into sustainable outcomes. From a theoretical standpoint, the study extends the sustainability and supply chain innovation literature by confirming the mediating influence of GSI. From a managerial perspective, it emphasizes the need for firms to invest in agile product development, robust data systems, and process integration strategies to effectively implement green service innovations that lead to tangible sustainability performance.

6. DISCUSSION AND CONCLUSIONS

This study explored the determinants of SSCP in Saudi Arabia's industrial sector, with a central focus on the mediating role of GSI. The empirical results confirmed the structural validity of all constructs and revealed robust statistical support for the proposed relationships. All four enablers, AIPs, BIR, SCPI, and GSCA, were found to positively influence GSI, affirming Hypotheses H1 through H4. Notably, SCPI demonstrated the strongest direct effect on GSI (β = 0.563, p = 0.010), underlining the critical role of process innovation in fostering eco-centric transformation.

GSI, in turn, exhibited a significant and strong impact on SSCP (β = 0.612, p = 0.018), thus validating Hypothesis H5. This finding confirms that companies which incorporate environmental factors into service innovation strategy achieve real gains in sustainability performance. These findings are in line with previous findings indicating that GSI drives ecological responsibility and improves the efficiency of the supply chain (Chen et al., 2015; Dong et al., 2023).

Moreover, the mediating role of GSI was fully supported across all indirect pathways (H6–H9). The indirect effect of SCPI on SSCP via GSI (β = 0.345, p = 0.010) was the most substantial, followed by GSCA (β = 0.186, p = 0.010), AIPs (β = 0.114, p = 0.018), and BIR (β = 0.090, p = 0.019). This suggests that though every determinant makes a contribution towards SSCP, the impact is much higher when channeled through GSI. The results substantiate the view that innovation-led greening of services is an essential mechanism for converting internal capability into sustainability, and particularly in the case of new economies like Saudi Arabia where digital transformation and sustainability are country-level imperatives (Moh'd Anwer, 2025; Ghaderi et al., 2024).

The weak direct links in other research on innovation enablers and performance (Wiesche, 2021) are contrasted by the present research in which indirect effects through GSI were statistically significant. This demonstrates the significance of having a mediating mechanism and not linear causality between technological progress and performance. GSI not only internalizes the complexity of the dimensions of agility, intelligence, and integration but also funnels them into cohesive action taken through plausible and targeted green services. Green services essentially serve as the operational lens through which innovation enablers influence performance.

The findings prove that companies that are dedicated to incorporating agile design, data intelligence, and process innovation into eco-sensitive service models are well-placed to achieve the sustainability standards set in Vision

2030 (Lee et al., 2025; Madkhali & Sithole, 2023). The present research therefore confirms that internal capabilities are not enough for the achievement of SSCP unless strategically developed into eco-innovative practices. The findings also provide empirical illumination and strategic guidance to policymakers and managers who seek to balance economic competitiveness with environmental responsibility within the industrial growth framework.

6.1. Managerial Relevance

The findings of this study carry substantial managerial and policy implications, particularly for firms and regulators operating within Saudi Arabia's evolving industrial landscape. The results affirm that GSI acts as a crucial mediating mechanism through which internal capabilities such as AIPs, BIR, SCPI, and GSCA influence SSCP. These insights provide a clear directive: managers must look beyond individual innovations and instead prioritize integrated green strategies that channel capabilities into environmentally responsible service innovations (Moh'd Anwer, 2025).

From the policy point of view, government agencies are able to utilize these findings to construct incentive policies to promote the investment in green capabilities. For instance, companies adopting strong SCPI achieved the largest effect on SSCP through GSI ($\beta = 0.345$, $p = 0.010$). This can guide the case for targeted tax reliefs and subsidies for companies adopting technology-led and green supply chain designs. Likewise, companies expressing agility and rapid responses in GSCA realized the largest performance gains through the mediation of GSI ($\beta = 0.186$, $p = 0.010$), highlighting the utility of adaptive operations.

For the executives, the message is clear: sustainability cannot be compartmentalized under corporate social causes; it has to be infused into innovation core processes. This means investing in data-driven readiness (BIR) and product agility (AIPs), not only for the sake of technological improvements, but as catalysts for green service transformation. By aligning strategically supply-chain responsiveness, analytics, and eco-innovation, companies can meet the environmental requirements and drive operational efficiency as well as market competitiveness.

These considerations align with Saudi Arabia's Vision 2030, which requires a move to clean energy, ethical industrial practices, and sustainable growth. The empirical validation of the role of GSI in the study makes the case for companies to build innovation roadmaps in terms of green service orientation. In addition, training programs within companies must include cross-functional green thinking, specifically between product development, operations, and sustainability, to get consistent and scalable implementation. This paper makes an unequivocal business case: eco-innovation is not only an act of compliance but also an action that drives long-term value and supply-chain resilience.

6.2. Academic Implications

The contribution to academic literature in the area of sustainable supply chain management through the validation of an extensive structural model that incorporates innovation, agility, intelligence readiness, and green service orientation as the main enablers of sustainability performance is noteworthy. Through the empirically confirmed mediating effect of GSI, the research refutes the existing knowledge gaps on how internal operating capabilities are translated into sustainable results in industrial settings (Moh'd Anwer, 2025). The findings are a response to the recent calls in the academic literature for frameworks that transcend the limitations of unilateral technological or environmental interventions and instead articulate the interaction between strategic drivers and green innovation practices in the context of an emerging economy.

The study utilizes stringent SEM, ensuring the validity of findings and providing methodological contribution to scholars conducting intricate causal analyses in sustainability research. The incorporation of the two-step modeling technique (Anderson & Gerbing, 1988), along with the application of multi-source validated instruments (Zhu et al., 2008; Bag et al., 2020; Ghaderi et al., 2024), maximizes the generalizability of the results. Further, the mitigation of common method bias in the study, validated using the Harman's one-factor test, indicates an internal validity-reinforcing strong design.

Significantly, in extending theory, GSI is depicted not as an end product but as an active mediator that describes how firms translate capabilities like SCPI and GSCA into enhanced SSCP. The highest mediating effect was found from SCPI → GSI → SSCP ($\beta = 0.345$, $p = 0.010$), attesting that green process integration is key in attaining sustainability. This theoretical advancement provides a more nuanced understanding of supply chain sustainability by illustrating how dynamic capabilities translate into performance gains when routed through environmental service innovations.

Contextually, the research offers rare insight into the Saudi industrial sector, where limited empirical studies exist on the integration of innovation and sustainability in supply chains. As Saudi Arabia accelerates its shift toward a green economy under Vision 2030, the findings serve as a timely contribution to region-specific sustainability literature. Furthermore, the study supports stakeholder theory by demonstrating that internal drivers aligned with stakeholder expectations, such as agility, data readiness, and innovation, positively influence environmental performance when mediated by GSI. This aligns with the growing recognition that stakeholder-informed sustainability strategies are essential to achieving long-term competitive advantage.

Ultimately, the research lays the foundation for future investigations exploring sector-specific differences in green innovation adoption, longitudinal effects of GSI on performance, and the role of policy frameworks in scaling sustainable practices. It sets a precedent for treating GSI as a central, mediating construct that bridges innovation input and sustainability output, a perspective essential for the next generation of research on sustainable industrial transformation.

6.3. Limitations and Future Research

This study provides meaningful insights into the drivers and mechanisms of SSCP within the Saudi industrial context; however, several limitations should be acknowledged. First, while the sample size of 238 respondents exceeds the minimum requirement for SEM (Kline, 2016), the ability to generalize findings remains constrained. The sample consisted predominantly of professionals in logistics, manufacturing, and service-based sectors within the Kingdom of Saudi Arabia, which may not fully represent broader regional or global supply chain ecosystems. Future studies are encouraged to employ larger and more heterogeneous samples, incorporating perspectives from additional countries or diverse industrial sectors to enhance external validity.

Second, although the survey targeted informed respondents holding operational and strategic positions, the research relied exclusively on self-reported data collected via a cross-sectional design. Despite mitigating common method bias through Harman's single-factor test (Podsakoff et al., 2003), future research could incorporate objective, time-series performance data or longitudinal tracking to assess the evolution of sustainability outcomes. This would allow scholars to evaluate the long-term effects of GSI and supply chain capabilities on sustainability performance, which may manifest over extended periods.

Third, the study focuses specifically on the mediating role of GSI, without assessing potential moderating influences such as regulatory pressure, competitive intensity, or environmental awareness at the consumer level. Introducing such moderators in future research could yield deeper insights into boundary conditions under which internal capabilities translate more effectively into sustainability outcomes. Likewise, although this research confirms the mediating strength of GSI, additional mediators, such as lean supply chain capabilities or digital transformation initiatives, could be explored to further unpack the pathways to sustainable performance (Moh'd Anwer, 2025).

Fourth, the geographical focus on the Saudi industrial landscape, while relevant under the Vision 2030 sustainability transformation goals, may limit the study's applicability to countries with different institutional structures, regulatory frameworks, or levels of environmental maturity. Future research might consider comparative studies between Saudi Arabia and other GCC nations to assess the consistency of model performance across similar economies.

Finally, the reliance on covariance-based SEM provided robust insights into causal linkages; however, experimental or longitudinal designs could establish firmer cause-and-effect relationships. Future work could also apply multi-level modeling approaches, particularly in multi-site organizations, to evaluate how firm-level factors interact with broader industry or regional variables. In sum, while this study offers a rigorous and timely contribution to sustainable supply chain literature, future research should expand its scope, methodology, and contextual breadth to build on its foundational insights.

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Developing Smart Competencies in Tourism Industry: A Perspective through Stakeholders' Mapping in Albania

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Abstract

The tourism industry has undergone fundamental changes due to technological developments and digitalization. As an information-intensive industry whose service delivery depends heavily on human resources, the need to strengthen workforce capacities is continuously growing. Smart competencies are essential for professionals in tourism and accommodation to enhance the value of services, with a focus on combining digital, green, and social skills. Stakeholders in tourism—including academia and education, tourism businesses, public authorities, and civil society—play an important role in strengthening smart competencies in the sector. This article aims to create a detailed map of stakeholders in Albania's tourism industry, identifying their profiles in relation to the roles and influence they have in improving smart competencies in tourism and accommodation.
The study was conducted through semi-structured interviews with stakeholders, using a non-probability sampling approach and a purposive selection of experts and stakeholder representatives identified in the field. The findings indicate a notable diversity across the four stakeholder categories defined by the quadruple helix model. The study also reveals a gap between the expected role of each stakeholder group and the role they perceive themselves to have in influencing the development of smart competencies. The identified lack of interaction among some stakeholder groups, as well as this gap, should be taken into account when designing strategies and coordinated actions among stakeholders, so that their influence effectively contributes to improving the provision of these competencies in the sector.

Keywords: smart competencies, tourism industry, stakeholders, innovative technologies, Quadruple helix model, tourism ecosystem

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1. INTRODUCTION

The tourism sector is a leading socio-economical driver in most European countries, thanks to its relevant weight on the nationals gross income, to its potential impact on many strategic social drivers (inclusiveness, cultural heritage, sustainability, and so on), to its indirect impacts on the local development and to the other economic sectors.

Digitalization, real-time interaction, and data governance have shifted value in tourism from linear supply chains to smart ecosystems where DMOs, businesses, visitors, and communities co-create (Gretzel et al., 2015). EU policies (e.g., Smart Tourism Destinations) require that the twin transition (green and digital) be supported by concrete workforce skills and institutional data capacities [23]. This makes mapping competencies across job roles and subsectors urgent in EU.

Albanian is a developing country in the EU boundaries, in the position of candidate country, with most of the chapters now open and in the process of adhering in the EU. *Tourism and Hospitality are among the most important sectors*, which constitute a large part of the Albanian economy, both in terms of money and employment. The World Tourism Organisation stated that Albania had the "best post-pandemic recoveries in the industry" in 2022, compared to 2019, with arrivals and revenue from tourism in a constant raise in these subsequent years from the Pandemic.

As human capital development is considered a key determining factor for smart specialisation [3], and tourism industry in Albanian is one of the three key sectors that drives sustainable development, a focus on smart competencies is imperative. They go beyond traditional technical skills; they include the ability to utilize digital tools, manage information effectively, interact with diverse stakeholders, and innovate in service design and delivery. The concept is central to Smart Tourism, where destinations and businesses leverage technology to enhance experiences, optimize operations, and promote sustainability.

Developing smart competencies through many possible tourism education and training programs is crucial. According to studies by the ETF [4] and RCC in 2021 [19], enterprises in Albania report a mismatch between the skills and competencies needed and those found in the market. Particularly among young people aged 15 to 24, but also in other age groups, there is a discrepancy between the skills required by the market and those possessed, as only 50.5% of employees have a job related to their field of study. In the tourism industry, while the sector is generating more jobs, the use of ICT is demanding digital knowledge and skills in occupations related to travel services, tourist guiding, accommodation services, cultural tourism, and "smart" tourism [13]. For these jobs, basic skills can be significantly enhanced through digital competencies, green skills, and other skills related to innovation in the industry (ILO 2021). Anyhow, the use of smart technologies and processes in tourism in Albania has not yet developed sufficiently, partly due to the lack of such competencies within businesses or across different sectors. For example, Albania is still at an early stage of digitalization processes in cultural heritage, although new initiatives supported by donors are increasing the demand for competencies in this field [14].

Under these conditions, tourism education has attracted considerable attention and the need to balance academic and professional requirements. Studies also show that insufficient attention has been paid to integrating smart competencies into tourism curricula [16]. The skills and knowledge required for smart destination management have not yet been clearly defined [17]. Albania, is also facing increasing demand for digital skills in tourism, but with limited opportunities for workers to acquire these skills through formal education [19]. On the other hand, the ILO study states that technological advancements require new approaches to education and training, highlight the need for reskilling and upskilling throughout one's career, and stimulate new forms of lifelong education and training for the required competencies. This requires a combination of private and public funding and efforts for capacity development. A preliminary assessment of the specific competencies required is essential before making decisions to invest in these competencies [13].

In this background, a project undertaken with the support of the National Agency of the Scientific Research and Innovation in Albania proposes building bridges and long-term relationships between academia and business to develop large-scale online training models (MOOC platforms), with the aim of increasing training capacities for smart competencies in the tourism industry. To achieve this goal, the preliminary assessment of competency gaps in this industry becomes particularly important, especially from the perspective of all stakeholders. In fact, what is missing both in current studies and in knowledge- and information-based strategies is a mapping process of stakeholders. They need not only to be identified and included as representatives in decision-making processes related to smart skills in tourism, but, more importantly, to have their role and impact in the process assessed.

The mapping process is based on the quadruple helix model, focusing on collaboration among actors who play a crucial role in the development of smart competencies in the tourism industry. This model includes four key forces: business or industry, public institutions, academia, and civil society organizations. Based on information from semi-

structured interviews with stakeholder representatives in the three most important tourism destinations in Albania, this paper describes the model and develops a qualitative study to:

identify stakeholder types, their representatives, and their roles in the tourism industry in Albania

evaluate the extent of stakeholders' influence in defining needs and in decision-making for strategies aimed at enhancing smart competencies in the tourism industry

develop a map of stakeholder types and their relationships in their efforts to improve smart competencies

1.1. Literature review

Smart tourism is defined in various ways, depending on specific research perspectives. Some studies highlight technological aspects, focusing on tourism systems enhanced by smart technology to improve tourist experiences and facilitate knowledge sharing among stakeholders. This technological implementation benefits tourists, destinations, and residents alike. The original concept of smart technology in tourism revolved around platforms that integrate information on tourist activities, consumption, and resource status. Such platforms have created information networks that connect stakeholders, promoting collaboration and knowledge exchange.

The tourism industry, as "the most visible expression of globalization" [20] presents its own challenges in developing smart competencies for its human resources. This industry has a strategic need to achieve a higher level of effectiveness in the labor market, especially to adapt to the needs of tourism businesses and its segments, due to the changing competencies required for success.

Tourism has historically been shaped by technological innovation, from the introduction of online reservation systems in the 1960s to the emergence of global digital platforms today. The accelerating pace of digital transformation has given rise to the concept of Smart Tourism, which refers to the integration of advanced digital technologies—such as the Internet of Things (IoT), big data analytics, artificial intelligence (AI), cloud computing, mobile applications, and immersive technologies—into tourism ecosystems [10].

On the other hand, cultural as well as social diversity continues to permeate every aspect of life as the world becomes more interconnected through processes of migration, urbanisation, and digitalisation. It is the socio-cultural aspect of tourism that necessitates soft skills as a primary element of the tourism industry. Additionally, meeting the demands of modern life will require a "higher level of mental complexity that implies critical thinking and a reflective and holistic approach to life"[21]. Gretzel [10] also encourages a greater level of recognition of the importance of critical thinking and social perceptiveness in the hospitality sector which requires sensitivity and empathy towards colleagues and customers.

The role of stakeholders is pivotal, not only in identifying needs for smart competencies in human resources, but also in promoting the different ways to impact the raise of such competencies. Stakeholder theory emphasizes the importance of managing relationships and balancing the diverse interests of actors involved in or affected by organizational activities. In the tourism sector, this theory explains how stakeholders such as local communities, government agencies, and private partners shape strategic decisions, resource access, and legitimacy, all of which are critical for successful digital transformation [18]

The advent of smart tourism has necessitated a paradigm shift in the competencies required by the workforce, leading to a critical examination of the roles various stakeholders play in developing new educational and training methodologies to cultivate these smart skills. This introductory exploration will delve into the multifaceted involvement of stakeholders, from governmental bodies to local communities, in identifying and mitigating the discrepancies between industry expectations for smart competencies and the current offerings of educational and training institutions [5] [7]This examination will also highlight the crucial need for specialized digital tool skills in marketing, planning, and promotional activities across all tourism enterprises, including travel agencies and hotels, due to the service-oriented nature of the sector and its continuous adaptation to customer and market demands (Mandalia, 2023). Furthermore, the identification of competency gaps necessitates a comprehensive understanding of both present and future industry needs, which can only be achieved through sustained collaboration among academic institutions, the private sector, and governmental bodies [12]. Such collaboration is essential for developing targeted training programs and curricula that align with industry standards and equip students with practical, industry-relevant skills through work-integrated learning opportunities like internships and apprenticeships [18]. The tourism industry and educators are widely recognized as sectors that are demanding a new educational paradigm [11], innovative methodologies [6forrestal,9], and learning experiences [2].Moreover, higher education institutions are increasingly expected to equip students with adaptable and evolving skill sets, making the redefinition of undergraduate tourism programs essential to address these challenges [18].

1.2. Methodology

The social network analysis (SNA), which is described by Casanueva *et al.* [1] refers to the elements of this analyses which include the types of stakeholders, their interrelationships and their level of involvement in governance. We have examined these elements in the case of three most important tourism areas in Albania representing all types of tourism subsets and environments. A list of types of stakeholders is identified through secondary data analyses, reports, website observation and other stakeholders documents. This analysis responds to the main research question of this study: What is the extent of the interrelation between tourism governance stakeholder networks and smart competencies improvements for tourism development?

A further semistructured interview was conducted throught a snowball sampling strategy, identifying first the most important figures representing tourism development in the areas, mostly from Tourism Business and public institutions representatives. Then the sample was widened with the most mentioned experts from Academia, and civil society, so represdenting the four groups of the Quadruple Helix.

The main sections themes of the interview questions relate to the role of the organization and the role of the representative in the issues of smart competencies, the mostly mentioned relationships with other stakeholders for the purpose of developing identified smart competencies and the perceived impact (power) that they have in develooping or impacting the strategies in smart competencies in tourism industry.

Data were analysed with the thematic qualitative analyses method and a final identification of themes and level of impact was developed, for each of the stakeholders.

1.3. The case of Albania – presenting the findings

The tourism ecosystem in Albania has changed over the years, reflecting political and legal developments as well as economic, social, and technological transformations [8]. At the level of central government, tourism policies have become more responsive to the needs of a growing market [9], and in the last two national strategies, which cover a 10-year period, significant importance has been given to the development of human resources in tourism, especially within professional studies in the VET system [8]. One of the most important stakeholders in this regard is the relevant agency, NAVETQ, as well as the orientation of professional tourism schools [8]. Of course, other agencies and especially local government have contributed to the growth and development of the sector, as well as to various projects that have included the digitalization of the sector, increased requirements for sustainable development, and consequently the rising demand for smart competencies [9].

Another administrative–territorial unit composed of several municipalities is the county, represented by tourism specialists. The inclusion of both levels of local government is important because they hold potential for partnerships in EU-funded projects, where their impact can be considerable.

On the other hand, the private sector in the tourism industry is represented by businesses in various subsectors, as well as business associations such as the Albanian Hoteliers Association, ATU, ATA, HAT – the Association of Professionals in Hospitality & Tourism – an organization dedicated to tourism professionals, and the Albanian Tourism Association (ATA), a broader association representing all tourism businesses and operators. Chambers of commerce are also an important element of the local ecosystem. An important part of the business ecosystem consists of digital platforms and technology providers, which form part of the tourism value chain and are directly connected to the need for digital skills and competencies as part of smart competencies in the industry.

The education ecosystem in Albania is extensive. Although higher education has traditionally carried the greatest responsibility in supplying the tourism sector with qualified professionals, during the 35 years of Albania's market economy—and particularly over the past decade [22]—there has been a strong emphasis on professional training in tourism through VET schools. Managerial roles in the industry, as well as many freelance and independent professional positions such as tour guides, continue to be largely shaped by university programs that prepare human resources for the sector.

Other organizations providing tourism training and capacity building include public training centers within the national employment services, as well as private training centers and courses offered by licensed private companies under the Ministry of Economy. These institutions hold important information regarding market needs and the current level of smart skills development within the tourism workforce.

Civil society on the other hand is represented by NGOs which are the most important actor in this part of the ecosystem in Albania, because of their Participation as partners in national and international projects. They may be considered as the second most important suppliers of information and studies as well as active interventions in relation to tourism in general and skills development and capacity building in tourism.

All the above mentioned types of stakeholders in tourism industry in Albania are grouped as in the Table 1. The list presents an orientation towards the most important persons not only inside the industry, but also in many institutions and organizations that are closely related to tourism industry and the opportunities for digitalization in tourism and accomodation in Albania. The joint interests of tourism operators and tourism businesses, education institutions, Public institutions and civil society organizations **are** identified. In this regard, the stakeholders list represent**s** all the actors of the Quadruple Helix in relation to tourism and smart and digital skills needed**.**

Table 1. Stakeholders in tourism industry according to groups

PUBLIC SECTOR/GOVERNMENT AUTHORITIES	TOURISM INDUSTRY
Ministry of Tourism and Environment (MTE)	Tourism business Associations, ATU (Albanian Tourist Union),
National Tourism Agency (AKT)	Accomodation businesses, Travel Agencies & Tour Operators
Ministry of Education, Sports and Youth (MASR)	SMEs in accommodation and hospitality
National Agency for Vocational Education and Training and Qualifications (NAVETQ/AKAFPK)	Digital platforms & intermediaries
Ministry of Infrastructure and Energy	Transport & Mobility Providers
Ministry of Culture	Technology Providers
Municipalities & Local Governments (tourism offices in municipalities and prefecture offices)	Industry Chambers
EDUCATION AND ACADEMIA	**CIVIL SOCIETY**
Universities, Tourism management programs with bachelor and mster degrees	NGOs in sustainable tourism & heritage
VET Providers, professional high schools present in 10 cities in Albania	Cultural heritage associations
Public training centers from the public services for employment	Professional associations
Training & Capacity-building private Centers, especially in digital skills and technologies	Youth associations
Research institutes	Local communities, tourists and residents employed in tourism

At the conclusion of the semi-structured interviews and the combined analysis, we present here the most frequently emerging themes from discussions with stakeholder representatives regarding their role, their perceptions of the level of smart competence development in the industry, as well as their direct or indirect interests in participating in, promoting, or influencing the enhancement of these competencies. The results of the analysis provide a detailed mapping of stakeholders not only from the perspective of their characteristics, but especially in terms of their profiling based on their behavior toward smart competencies—both within their organizations and institutions, and in the roles they play in strengthening these competencies in the market.

In the initial profiling, the interviews identified a higher number of participants from local and regional government bodies, as well as from academia and education, who agreed to participate in the study and granted permission for the use of the information provided. There was lower participation from business representatives and civil society. Public and semi-public institutions showed high participation rates, whereas business participation was lower due to their daily operational commitments and the difficulty of allocating time and space for interviews, especially given the presence of clients during the study period.

The themes identified across the interviews begin with the recognition of gaps in smart competencies within the tourism industry. Several business representatives familiar with the field emphasized the need for smart skills—not only digital skills, but also communication, leadership, teamwork, and social competencies, all of which form part of smart competencies. As for sustainability-related competencies, these appeared less evident in the field and were not widely demanded by businesses, nor perceived as immediately essential. Many stakeholders considered the lack of physical or regulatory infrastructure to be a more pressing issue in Albania than sustainability competencies at this stage.

Stakeholders from academia and education highlighted the lack of interaction with businesses, which creates a gap between the competencies demanded by the market and those offered by education programs. The absence of continuous education was also noted by stakeholder representatives as a missed opportunity for both businesses and professionals working in tourism.

Regarding the role and level of impact perceived by each participant, the discussion reflects a difference between the interviewees' perceptions of the roles they currently play and the roles they should have according to the literature and the broader ecosystem. The focal points in the stakeholder mapping, as shown in Figure 1, are the Ministry of Tourism and Environment, universities, municipalities, and tourism agencies or operators at the national level. These

are the stakeholders with the strongest interconnections with other actors and those expected to have the greatest influence.

In practice, in Albania, professional schools represented by the relevant agency, NAVETQ, have a significant influence on the development and improvement of smart competencies and should, in fact, have the highest level of impact. Meanwhile, industry associations have a much lower influence than they should ideally have.

In mapping terms, the level of power (impact) and interest suports this classification:

- Theoretically High Power / High Interest: Ministries (Tourism, Education), Hotel and other industry Associations, Businesses, Universities. – Self Perception: Medium to Low Power and high interest.
- Theoretically High Power / Low Interest: Transport providers, investors, some municipalities. – self perception low power/medium interest
- Theoretically Low Power / High Interest: NGOs, local communities, youth organizations. - Self Perception: Medium power/ Medium interest
- Theoretically: Low Power / Low Interest: Smaller businesses not yet adopting smart tech.

The Role of communities is practically almost inexistent, different from what literature says in realtion to communities [13 Gorica]

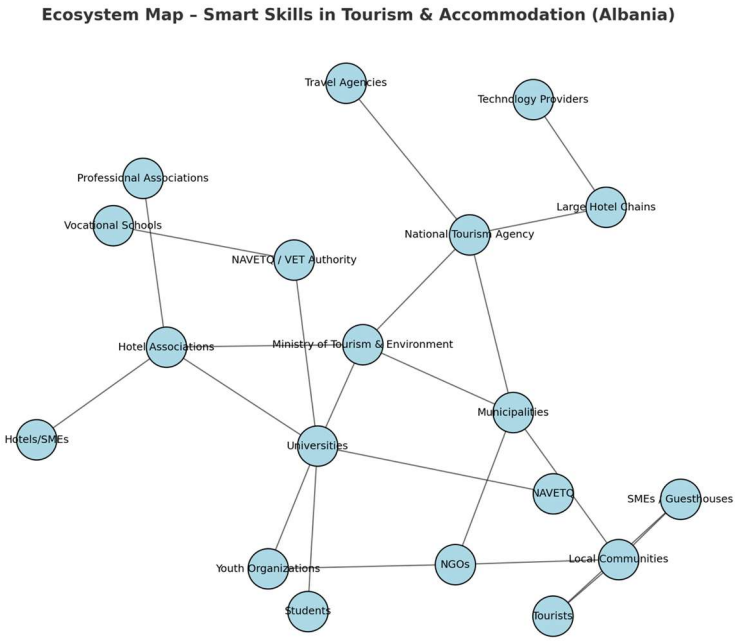

Fig. 1. Ecosystem (Stakeholders) Map for tourism smart competencies development

1.4. Conclusions and recommendations

The concept of smart tourism has been addressed by many authors and from various perspectives within the tourism industry, such as smart destinations, smart tourists, and smart cities. However, increased attention in recent years has been devoted to human resources, especially in countries where tourism has been identified as one of the pillars of sustainable economic development, including Albania. The strategies developed—particularly the Smart Specialization Strategy—highlight the role of human resource development, among other aspects, through smart

competencies. These are 21st-century competencies, which do not include only digital skills, as might be assumed in a narrow interpretation. These competencies also encompass social dimensions and those related to sustainable tourism.

The continuous development of tourism professionals with these competencies in Albania appears formally to fall under the influence of pre-university and university education, as well as academia. In reality, however, it is the result of the work and efforts of all stakeholders. A list of detailed stakeholders representatives categorizes them in four main categoires and through this classification their profile is identified. Anyhow there is a gap identified not only in smart competencies possesed in the industry and the requirements of operators. The gap exists also between the perceived role and impact that the stakeholders have and the real capacities of their institutions and organizations to impact positively in smart skills development.

This study lays the ground to further possible studies and considerations in relation to specific themes to fill the gaps in smart competencies level of adoption in the tourism businesses. Few limitations of the study have to do with

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From Chatbots to Business Impact: Value Creation in Conversational AI Implementations

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Abstract

Conversational artificial intelligence (AI) is increasingly deployed across industries to automate service interactions, support employees, and personalize customer engagement. Despite widespread adoption, limited research explains how conversational AI creates organizational value and under what conditions such value is realized. Addressing this gap, this study examines conversational AI implementations led by global AI integrator firms acting as technology transfer intermediaries. Drawing on Task–Technology Fit (TTF) theory and a realist Context–Mechanism–Outcome (CMO) framework, we conduct a qualitative multi-case study of 24 conversational AI projects across diverse industries and regions. Using systematic CMO analysis, we identify five dominant value-creation configurations: (1) customer service automation at scale, (2) AI-powered knowledge assistance, (3) human–AI service augmentation, (4) proactive engagement and personalization, and (5) integrated process orchestration. Each configuration specifies the contextual conditions, conversational AI mechanisms, and resulting operational, customer, financial, and organizational outcomes. The findings advance theory by integrating TTF with configurational realist logic and offer practitioners evidence-based guidance for designing conversational AI initiatives that create business value.

Keywords: Artificial Intelligence, Conversational AI, Chatbots, Value Creation, Context-Mechanism-Outcome

1. INTRODUCTION

Conversational artificial intelligence (AI), defined as software systems that interact with users through natural language dialogue, has emerged as a central component of contemporary digital transformation initiatives. Advances in machine learning, natural language processing, and, more recently, large language models have enabled conversational agents to move beyond simple rule-based chatbots toward systems capable of intent recognition, contextual dialogue management, and generative responses [1, 2]. As a result, conversational AI is now widely deployed across industries such as retail, banking, telecommunications, healthcare, and public administration to automate customer service, support employees, and personalize interactions at scale [3].

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From a managerial perspective, conversational AI is frequently promoted as a technology that can simultaneously reduce operational costs, improve service quality, and enable new forms of customer engagement. Prior studies and industry evidence suggest that conversational agents can provide round-the-clock service availability, reduce waiting times, and handle high volumes of routine inquiries, thereby lowering cost-to-serve and improving customer satisfaction [4, 5]. Beyond customer-facing applications, organizations increasingly deploy conversational AI internally to support employees in tasks such as knowledge retrieval, IT support, and human resource inquiries, with reported gains in productivity and consistency [6, 7]. These developments have contributed to strong expectations regarding the business value of conversational AI.

Despite this growing adoption, academic understanding of how conversational AI creates organizational value remains limited and fragmented. Much of the existing literature focuses on micro-level issues such as user perceptions, trust, anthropomorphism, and intention to use [1, 8]. While this work is essential for understanding adoption and interaction quality, it offers only partial insight into organizational-level outcomes such as efficiency gains, cost reduction, or innovation. Other studies document potential benefits but often treat value creation as a direct or universal consequence of deployment, without specifying the conditions under which these benefits materialize [3]. As a result, organizations continue to experience mixed outcomes: while some conversational AI initiatives deliver measurable performance improvements, others fail to meet expectations or even generate negative user experiences [5].

A central reason for these divergent outcomes lies in the contingent nature of conversational AI value creation. Conversational AI systems differ substantially in their capabilities, ranging from simple FAQ retrieval to transaction execution, proactive engagement, and real-time human assistance. Likewise, organizational tasks vary in structure, complexity, and required levels of human judgment. Prior research in information systems has long emphasized that the performance impact of technology depends on how well technological capabilities align with task requirements. Task–Technology Fit (TTF) theory formalizes this insight by arguing that information technologies improve performance only when their functionalities match the tasks users must perform [9, 10]. When fit is low, technology adoption may still occur, but performance benefits are limited or absent.

Although TTF theory has been applied to domains such as decision support systems, groupware, and analytics, its application to conversational AI remains underdeveloped. Existing conversational AI studies rarely analyze whether specific AI capabilities are appropriate for particular task types, nor do they systematically link fit to organizational outcomes. Recent work hints at the relevance of this perspective. For example, research on customer service chatbots suggests that conversational AI performs well in handling structured, repetitive inquiries but struggles with complex or emotionally laden interactions, where human involvement remains critical [11]. However, these insights are often implicit and not integrated into a broader explanatory framework.

In addition to task–technology alignment, conversational AI implementations are embedded in complex organizational contexts. Factors such as industry characteristics, regulatory requirements, legacy IT systems, data availability, and organizational readiness shape both design choices and outcomes. To account for this complexity, scholars increasingly call for approaches that move beyond simple cause–effect models toward configurational explanations of digital innovation outcomes [12]. The Context–Mechanism–Outcome (CMO) framework from realist evaluation offers such an approach by emphasizing that interventions work through specific mechanisms that are activated only under certain contextual conditions, producing particular outcomes [13, 14]. While CMO logic has been applied in domains such as healthcare and public policy, it has rarely been used to analyze AI-enabled information systems.

This study addresses these gaps by examining how conversational AI creates business value through the combined lenses of Task–Technology Fit and Context–Mechanism–Outcome logic. Rather than asking whether conversational AI is valuable in general, we ask how, when, and why different conversational AI solutions lead to specific organizational outcomes. We focus on implementations led by global AI integrator firms, which play a critical role as technology transfer intermediaries by translating advanced AI capabilities into operational solutions for client organizations [15, 16]. These firms operate across industries and geographies, making them uniquely positioned to observe recurring patterns of success and failure in conversational AI deployments.

Empirically, the study draws on a qualitative multi-case analysis of 24 conversational AI implementations conducted by nine global AI integrator firms between 2018 and 2024. By analyzing these cases using realist CMO logic, we identify recurring configurations that link implementation context, conversational AI mechanisms, and organizational outcomes. This approach allows us to develop mid-range theoretical explanations of conversational AI value creation that are grounded in empirical evidence while remaining generalizable across settings [17]. Accordingly, the study is guided by two research questions:

RQ1: How do conversational AI solutions create business value in organizations, and through which mechanisms is this value realized?

RQ2: Under what contextual conditions do specific conversational AI capabilities lead to successful outcomes, and how does task–technology fit influence these results?

By answering these questions, the study makes three contributions. First, it advances conversational AI research by providing a structured, empirically grounded account of value creation mechanisms, moving beyond adoption-focused perspectives. Second, it extends Task–Technology Fit theory to the domain of conversational AI by demonstrating how different AI roles—automation, assistance, augmentation, and orchestration—align with distinct task profiles. Third, it introduces a configurational, realist perspective to the study of AI-enabled information systems, highlighting how context conditions shape outcomes. For practitioners, the findings offer an evidence-based framework for diagnosing organizational contexts and designing conversational AI solutions that are more likely to deliver sustainable business value.

2. THEORETICAL FRAMEWORK

2.1 Conversational AI and value creation

Conversational AI has become an increasingly important class of information systems due to its ability to mediate interactions between organizations and users through natural language. Prior research shows that organizations deploy conversational AI to achieve multiple objectives, including improving service efficiency, reducing operational costs, enhancing customer experience, and supporting employees in knowledge-intensive tasks [3]. These systems are particularly attractive in contexts characterized by high interaction volumes, information asymmetries, and pressure for scalability.

Empirical studies indicate that conversational AI can generate operational value by automating routine interactions, such as frequently asked questions or standardized service requests, thereby reducing workload for human agents and lowering cost-to-serve [4]. At the same time, conversational AI can improve customer experience by offering immediate responses and extended availability beyond traditional service hours, which addresses common sources of dissatisfaction such as long waiting times [5]. In internal organizational settings, conversational AI is increasingly used to support employees by providing access to policies, procedures, and technical knowledge, which can improve productivity and decision quality [6, 7].

Beyond efficiency gains, conversational AI has been associated with more strategic forms of value creation. By enabling personalized, data-driven interactions at scale, conversational AI systems can support sales, marketing, and customer engagement activities, contributing to higher conversion rates and improved retention [18]. Conversational interfaces can also function as sensing mechanisms, capturing rich interaction data that organizations can analyze to identify customer needs, service bottlenecks, and innovation opportunities [3]. These capabilities suggest that conversational AI can act not only as an automation tool but also as a source of organizational learning and innovation.

However, the literature also documents significant limitations and risks. Conversational AI systems may fail when they encounter ambiguous, emotionally charged, or out-of-scope queries, leading to user frustration and erosion of trust [5]. Service failures, such as inaccurate responses or repeated misunderstandings, can reduce users' intention to reuse conversational agents, even when availability and speed are high. These mixed outcomes highlight that conversational AI does not automatically create value; rather, its impact depends on how it is designed, deployed, and embedded in organizational processes.

Overall, existing research establishes the potential of conversational AI to create organizational value, but it provides limited explanation of how this value is realized and why similar technologies produce different outcomes across contexts. To address this gap, a more precise theoretical lens is needed—one that explicitly links conversational AI capabilities to task characteristics and contextual conditions.

2.2 Task–Technology Fit approach

Task–Technology Fit (TTF) theory offers a foundational framework for explaining the performance impact of information systems. Originally articulated by Goodhue and Thompson (1995) [9], TTF posits that technology improves individual or organizational performance when its functionalities align with the requirements of the tasks it supports. The theory emphasizes that utilization alone is insufficient; performance gains occur only when the technology provides the right capabilities for the task at hand.

TTF research typically conceptualizes tasks in terms of characteristics such as complexity, structure, interdependence, and information requirements, while technology is characterized by its functionalities, reliability, accessibility, and integration capabilities [9, 19]. When task demands and technological capabilities are aligned, users are more likely to use the system effectively, leading to improved outcomes such as efficiency, accuracy, and productivity. Conversely, misfit can result in low utilization, workarounds, or even negative performance effects.

In the context of conversational AI, task–technology alignment is particularly salient. Conversational AI systems vary widely in their capabilities, ranging from basic informational chatbots to advanced assistants capable of executing transactions, orchestrating workflows, or augmenting human decision-making. At the same time, organizational tasks differ in their level of structure and need for human judgment. For example, answering standardized policy questions or resetting passwords represents highly structured tasks with clear rules and outcomes, which are well suited to conversational AI automation. In contrast, tasks involving negotiation, empathy, or complex problem-solving often require human involvement and may benefit more from AI augmentation than full automation [11, 20].

Recent studies implicitly support the relevance of TTF in conversational AI contexts. Research on customer service chatbots shows that conversational agents perform best when handling repetitive and well-defined inquiries, while human agents remain essential for complex or emotionally sensitive interactions [11]. Similarly, studies on generative AI-based assistants suggest that user satisfaction and continued use depend on whether the system supports users' actual task needs rather than offering generic conversational capabilities [21]. However, these insights are often fragmented and not systematically linked to organizational performance outcomes.

Applying TTF to conversational AI highlights that value creation depends not only on deploying advanced AI models but also on selecting appropriate conversational roles for specific tasks. A conversational AI designed for knowledge retrieval may deliver substantial value in information-intensive contexts but perform poorly if used for transaction-heavy processes without sufficient system integration. Likewise, deploying a fully autonomous chatbot in a context requiring human discretion may reduce service quality rather than improve it. These observations underscore the need to examine conversational AI value creation through a task-sensitive lens.

2.3 Context–Mechanism–Outcome perspective

While TTF focuses on alignment between tasks and technology, it provides limited guidance on how broader contextual conditions shape outcomes. To address this limitation, we complement TTF with the Context–Mechanism–Outcome (CMO) framework from realist evaluation [13]. The CMO framework conceptualizes interventions as working through specific mechanisms that are triggered only under particular contextual conditions, leading to observable outcomes.

In realist terms, context refers to the organizational, institutional, and technological conditions under which an intervention is implemented, such as industry characteristics, regulatory requirements, data availability, and legacy systems [22]. Mechanisms are the generative processes through which the intervention produces effects, including users' reasoning, behaviors, and interactions with the technology [14]. Outcomes are the resulting changes, such as improved efficiency, satisfaction, or financial performance.

The CMO framework is particularly well suited to studying conversational AI because these systems are socio-technical interventions whose effects depend on user engagement, organizational processes, and technological configuration. For example, a conversational AI system may improve customer satisfaction (outcome) because it enables instant responses (mechanism), but only in contexts where users value speed over human interaction and where the system has access to accurate information (context). Without these contextual conditions, the same mechanism may fail to generate positive outcomes.

Although realist approaches have been widely applied in healthcare and public-sector research, they have rarely been used to analyze information systems or AI implementations. However, recent IS research increasingly recognizes the need for configurational explanations that capture how combinations of factors produce outcomes, rather than assuming linear causality [12]. The CMO framework aligns with this perspective by emphasizing that "what works" depends on "for whom" and "under what conditions."

3. METHOD

This study adopts a qualitative multi-case study design to examine how conversational AI creates business value in organizational settings. Case study research is particularly suitable for investigating complex socio-technical phenomena embedded in real-world contexts, where boundaries between the phenomenon and its environment are not clearly defined [23]. Conversational AI implementations involve interactions between technology, organizational processes, and human actors, making them well suited to in-depth, contextual analysis.

A multiple case design was chosen to enable cross-case comparison and theory building. Compared to single-case studies, multiple cases enhance analytical generalization by revealing recurring patterns and configurations across different contexts [17]. Rather than aiming for statistical generalization, the study seeks to develop mid-range theory that explains how and why conversational AI creates value under specific conditions.

The empirical setting of the study consists of conversational AI implementations led by global AI integrator firms. These firms act as technology transfer intermediaries by adapting, implementing, and embedding advanced AI technologies within client organizations [15]. Focusing on integrator-led projects provides access to a wide range of industries, use cases, and organizational contexts, while holding constant the role of professional intermediaries in solution design and deployment.

Nine global AI integrator firms were selected through purposive sampling based on three criteria: (1) demonstrated experience in delivering conversational AI solutions, (2) engagement in projects across multiple industries and geographies, and (3) involvement in end-to-end implementation rather than isolated pilot initiatives. The selected firms operate in sectors including financial services, telecommunications, healthcare, retail, manufacturing, and public administration, and are headquartered in North America, Europe, and Asia. Across these firms, we analyzed 24 conversational AI implementation cases. Each case involved the deployment of a conversational interface as a core component of the solution. The cases span both customer-facing and internal organizational applications, including service automation, knowledge assistance, employee support, sales enablement, and process orchestration. This diversity allowed us to capture variation in task types, organizational contexts, and AI capabilities.

Data were analyzed using a realist Context–Mechanism–Outcome (CMO) logic, which focuses on identifying how specific mechanisms generate outcomes under particular contextual conditions [13, 14]. This approach is well suited to studying conversational AI because it allows us to explain not only whether value is created, but how and under what circumstances it emerges.

We developed an initial CMO codebook informed by prior realist evaluation studies and information systems research. Context codes captured organizational and problem-related conditions such as high interaction volume, cost pressure, knowledge fragmentation, regulatory complexity, and legacy IT constraints. Mechanism codes represented key conversational AI capabilities and roles, including informational assistants, transactional agents, knowledge retrieval systems, agent-assist co-pilots, proactive outreach agents, and workflow orchestration assistants. Outcome codes captured operational, customer, financial, and organizational effects, such as cost reduction, productivity improvement, customer satisfaction, and innovation.

Coding was conducted iteratively using qualitative content analysis. In the first phase, we performed within-case analysis, constructing a CMO narrative for each case that linked contextual conditions to conversational AI mechanisms and reported outcomes. This step helped preserve case-level richness and ensured that mechanisms were interpreted in relation to specific organizational settings.

In the second phase, we conducted cross-case analysis to identify recurring patterns across cases by examining which combinations of contexts and mechanisms were consistently associated with similar outcomes. This configurational analysis allowed us to move beyond individual cases and identify a small number of higher-order CMO configurations that explain conversational AI value creation across settings.

4. FINDINGS

The cross-case analysis of 24 conversational AI implementations revealed five recurrent Context–Mechanism–Outcome (CMO) configurations through which conversational AI creates business value. Each configuration represents a distinct pattern in which specific organizational contexts activate particular conversational AI mechanisms that, when aligned with task requirements, generate consistent outcome profiles. Rather than isolated success factors, these configurations illustrate configurational causality, whereby value emerges from the interaction between context, task–technology fit, and AI-enabled mechanisms.

The first configuration emerges in contexts characterized by high volumes of routine customer inquiries, significant service backlogs, and strong pressure to reduce operating costs. These conditions are common in industries such as telecommunications, retail, insurance, and utilities, where customer service organizations must handle thousands of repetitive requests daily. Typical problems include long waiting times, inconsistent service quality, and rising cost-per-contact. The mechanism that generates value in this configuration is the deployment of conversational AI as an automated service agent capable of answering frequently asked questions and executing standardized transactions. These conversational agents rely on structured knowledge bases and backend system integrations to handle tasks such as account inquiries, password resets, order tracking, or appointment scheduling. The task–technology fit in this configuration is high because the underlying tasks are highly structured, predictable, and rule-based, aligning well with the strengths of conversational AI in pattern recognition and rapid response generation [4].

Across cases, this configuration consistently produced operational and customer-related outcomes. Organizations reported increased containment and automation rates, extended service availability through 24/7 support, and reductions in average handling time and cost-to-serve. From a customer perspective, faster response times and immediate resolution of simple requests contributed to improved satisfaction, provided that the conversational AI delivered accurate and reliable responses [5]. However, cases also indicated that value was contingent on clearly defining the scope of automation and implementing effective handover mechanisms for out-of-scope inquiries, underscoring the importance of maintaining task–technology alignment.

The second configuration is observed in knowledge-intensive contexts where employees or customers struggle to access relevant information at the point of need. These settings are characterized by fragmented documentation, complex policies, regulatory requirements, or large repositories of unstructured content. Common examples include internal support functions, compliance-related inquiries, and technical or policy-driven service environments. The core mechanism in this configuration is conversational AI functioning as a knowledge retrieval and grounding assistant. Users interact with the system through natural language queries, and the AI retrieves, synthesizes, and reformulates information from enterprise knowledge bases, documents, or policy repositories. This mechanism exhibits strong task–technology fit because conversational AI excels at mapping natural language questions to relevant content and reducing search effort in information-rich environments.

This configuration generally led to improved first-contact resolution, faster decision-making, and reduced reliance on subject-matter experts. Employees reported productivity gains due to reduced time spent searching for information or clarifying policies, while organizations benefited from more consistent and compliant responses in regulated contexts [6]. Importantly, outcomes were strongly dependent on the quality and governance of underlying knowledge sources. Where content was outdated or poorly structured, the same mechanism produced weaker or inconsistent results, illustrating the contextual sensitivity emphasized by the CMO framework.

The third configuration arises in complex or high-stakes service environments where tasks require human judgment, empathy, or contextual reasoning, making full automation undesirable or infeasible. These contexts include advanced customer service interactions, sales support, and internal decision-making processes. Common challenges involve cognitive overload for employees, inconsistent service quality, and long resolution times. Rather than replacing human workers, the conversational AI mechanism in this configuration operates as an agent-assist or co-pilot system. The AI supports human agents in real time by suggesting responses, retrieving relevant information, summarizing interaction history, or automating routine subtasks. This configuration reflects a complementary task–technology fit, in which conversational AI handles structured subtasks and information processing, while humans retain responsibility for judgment-intensive aspects [11, 20].

The outcomes associated with this configuration include improved agent productivity, greater consistency in service delivery, and enhanced customer experience. Employees reported reduced cognitive effort and increased confidence when supported by AI recommendations, while customers benefited from faster and more accurate responses without losing access to human interaction. Notably, the success of this configuration depended on organizational context factors such as training, trust in the system, and clear role boundaries between human and AI. When agents perceived the AI as supportive rather than controlling, performance improvements were most pronounced.

The fourth configuration is found in contexts where organizations seek to create value through anticipatory and personalized interactions rather than purely reactive service. These environments are characterized by missed revenue opportunities, delayed user actions, or low engagement resulting from generic communication. Organizations often possess relevant customer or process data but lack the capability to act on it in a timely and individualized manner. The conversational AI mechanism in this configuration involves proactive outreach and personalized guidance. Instead of waiting for users to initiate contact, the AI triggers interactions based on events,

behavioral data, or predefined rules, offering reminders, recommendations, or tailored assistance. The task–technology fit is strong because AI systems can continuously monitor data streams and generate timely, personalized messages at scale, a task that is difficult to perform manually [18].

Empirical outcomes include increased user engagement, higher completion rates for targeted actions, and improvements in conversion or retention. For example, proactive reminders reduced process delays, while personalized recommendations supported more effective sales interactions. However, the configuration's effectiveness depended on contextual factors such as data availability, user consent, and perceived relevance. In contexts where proactive messages were poorly timed or insufficiently personalized, users perceived them as intrusive, reducing their effectiveness.

The fifth configuration emerges in contexts characterized by complex, multi-step processes and fragmented IT landscapes. These environments often involve legacy systems, manual handoffs, and high coordination costs, leading to slow turnaround times and operational errors. Both employees and customers face difficulties navigating multiple systems and procedures. In this configuration, conversational AI functions as a workflow orchestration layer that translates natural language input into coordinated actions across multiple backend systems. Through multi-turn dialogue, the AI collects required information, applies business rules, and triggers integrations with enterprise systems such as ERP or CRM platforms. This mechanism demonstrates high task–technology fit for process coordination tasks, as conversational AI simplifies access to complex workflows while abstracting underlying system complexity.

Outcomes associated with this configuration include reduced process cycle times, fewer errors, and improved operational efficiency. Organizations also reported greater agility, as conversational interfaces enabled faster adaptation of processes without extensive user retraining. Beyond efficiency, this configuration contributed to organizational innovation by redefining how users interact with enterprise systems, positioning conversational AI as a unifying interface for digital operations [12].

5. CONCLUSIONS

This study set out to explain how conversational AI creates business value in organizations, moving beyond adoption-focused perspectives to examine the mechanisms and conditions through which value is realized. Drawing on Task–Technology Fit (TTF) theory and a realist Context–Mechanism–Outcome (CMO) perspective, we analyzed 24 conversational AI implementations delivered by global AI integrator firms across industries and regions. The findings reveal that conversational AI does not generate value uniformly; rather, value emerges through distinct configurations in which conversational AI mechanisms align with task requirements and are activated within enabling organizational contexts.

The study demonstrates that conversational AI creates value through five primary mechanisms: (1) automating routine customer service at scale, (2) providing AI-powered knowledge assistance, (3) augmenting human service work, (4) enabling proactive and personalized engagement, and (5) orchestrating integrated business processes. These mechanisms correspond to different conversational AI roles—agent, assistant, co-pilot, proactive advisor, and orchestration layer—each associated with a characteristic pattern of outcomes. Operational efficiency gains, improved customer satisfaction, enhanced employee productivity, revenue-related benefits, and organizational innovation were all observed, but only when the conversational AI mechanism was appropriate for the task and context. In addition, the findings underscore the centrality of task–technology fit in conversational AI success. Across all configurations, positive outcomes were observed only when conversational AI capabilities aligned closely with the structure, complexity, and judgment requirements of the task. Highly structured and repetitive tasks were well suited to automation, while complex or high-stakes tasks benefited most from human–AI augmentation rather than full autonomy. These results empirically validate and extend TTF theory in the context of conversational AI, demonstrating its relevance for explaining performance outcomes in AI-enabled information systems. Importantly, the study highlights that fit is not binary but can be complementary, as seen in augmentation scenarios where value arises from an effective division of labor between humans and AI.

By integrating TTF with a realist CMO perspective, the study contributes a configurational explanation of conversational AI value creation. Rather than assuming linear causality, the findings show that outcomes result from combinations of contextual conditions and AI mechanisms. For example, the same conversational AI capability produced different outcomes depending on data quality, organizational readiness, regulatory constraints, or user expectations. This configurational view advances information systems research by demonstrating how realist evaluation logic can be applied to digital and AI-driven interventions, a domain where such approaches remain underutilized. The study also contributes to the literature on technology transfer and innovation intermediaries. By

focusing on global AI integrator firms, we show that successful conversational AI deployment involves more than technology implementation. These firms act as translators and configurators, aligning AI capabilities with organizational tasks, redesigning processes, and managing change. In doing so, they play a critical role in converting advanced AI technologies into realized business value. This insight reinforces the view of innovation intermediaries as active shapers of value creation rather than passive conduits of technology.

From a practical perspective, the five configurations identified in this study provide an evidence-based framework that organizations and AI integrator firms can use to guide conversational AI initiatives. Rather than adopting conversational AI as a generic solution, practitioners can diagnose their organizational context, identify the dominant task challenges, and select conversational AI roles that exhibit strong task–technology fit. This approach can help manage expectations, reduce implementation risk, and increase the likelihood of sustainable value creation.

As with any qualitative research, this study has limitations that open avenues for future work. First, the findings are based on qualitative case evidence. Future research could complement this work with quantitative studies that measure task–technology fit and performance outcomes across larger samples of organizations. Experimental or longitudinal designs could further strengthen causal inference. Second, while the study captures a broad range of industries and use cases, it focuses on integrator-led implementations. Future studies could examine conversational AI deployments developed in-house or by smaller vendors to assess whether similar configurations emerge. Third, rapid advances in generative AI are likely to expand conversational AI capabilities, potentially giving rise to new configurations. Ongoing research should examine how evolving AI technologies reshape task–technology boundaries and organizational value creation.

In conclusion, this study demonstrates that conversational AI can be a powerful driver of organizational value when deployed with a clear understanding of task requirements and contextual conditions. By offering a theoretically grounded and empirically validated framework, the study advances scholarly understanding of conversational AI while providing actionable guidance for organizations navigating AI-enabled digital transformation.

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Strategic Planning of Natural Capital: Optimizing Ecosystem Services in Protected Areas

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Abstract

Protected area management requires the strategic allocation of scarce natural resources among conflicting ecological and socioeconomic objectives. This study addresses this challenge in Altındere Valley National Park by employing a linear programming model to optimize four key ecosystem services namely; wood production, soil condervation, water production, and carbon sequestration. Soil conservation and water production values were estimated with the help of previously conducted studies using stand parameters such as basal area or number of trees, while carbon storage was computed species specific wood density and biomass expansion factors. Five dissimilar strategic objectives were generated and evaluated under selected constraints safeguarding local household needs. Using LINDO 10.0 ™ software, the study compares single-focus strategies against a holistic management approach within a five 10-year planning horizon. The results reveal a critical economic trade-off: The strategy maximizing the Total Net Present Value (NPV) of all services (STR1) generated a total economic value of 1.45 billion TL. This holistic strategy outperformed the traditional timber-maximization strategy (STR5) by 28.35%, despite harvesting approximately 73% less timber. Conversely, aggressive timber extraction incurred significant opportunity costs through soil erosion and carbon loss. These findings demonstrate that integrating non-market values into strategic management is economically superior to timber-centric models, offering a quantitative decision-support framework for maximizing natural capital value.

Keywords: Natural Capital, Optimization, Linear Programming, Resource Management, Ecosystem Services.

1. INTRODUCTION

In the contemporary context, sustainable development goals necessitate a transition from classical production-oriented approaches to multi-use management paradigms in the utilization of natural resources. Forest ecosystems are increasingly evaluated not merely as physical stocks providing raw materials, but as critical components of "natural capital" that underpin sustainable economic development (Costanza et al., 2014; Millennium Ecosystem Assessment, 2005). Indeed, the forestry economics literature underscores that the use value of non-wood forest products and services (NWFPS) often economically outweighs the direct value of timber production (Geray, 1998).

The functional and effective management of forest resources depends on the explicit definition of these non-wood products and services, the accurate estimation of their economic values, and the integration of these valuations into

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strategic and tactical planning frameworks (forest management plans) (Davis et al., 2001; TEEB, 2010). This integration is essential not only for resource sustainability but also for elevating the perceived importance of forest resources and ensuring the forestry sector receives its deserved recognition at the macroeconomic level. However, a fundamental challenge for protected area managers lies in the monetary estimation of forest values as well as the optimization of conflicting objectives—such as the trade-offs between timber production, soil protection, water production or carbon storage (Millennium Ecosystem Assessment, 2005; Weintraub & Romero, 2006). Allocating resources to maximize social welfare under the constraints of local stakeholders aligns directly with the "constrained resource optimization" principle of modern management science (Hillier, 2005).

In this context, there is a distinct need for analytical studies aimed at integrating non-wood products, services, and benefits into forest management plans. A review of the literature reveals that economic valuation studies in Türkiye often lack this integrative dimension. Although academic interest in the subject has increased in recent years, most studies are constructed on a limited number of forest values and tend to overlook the optimization. The question of how to reflect the complex trade-offs between ecosystem services in management plans remains a current and critical research problem.

To address this gap, this study develops a strategic planning model for the Altındere Valley National Park, incorporating wood production, soil protection, water production, and carbon sequestration forest values. By employing Linear Programming (LP) and LINDO 10.0 software, the study aims to maximize "Total Net Present Value" (Total NPV) under local household constraints. Consequently, this research compares the economic outcomes of four dissimilar strategic objectives and proposes a quantitative management model capable of integration into forest management plans. All national parks face similar challenges in delivering sustainable goods and services to meet current and future demands of the society. National Park authorities are aware of the real needs specific to their region but often find it difficult to identify detailed information on targeted solutions that would deliver direct and tangible positive outcomes.

2. MATERIALS AND METHODS

2.1. Study Area

Altındere Valley National Park (NP), one of the 50 national parks in Türkiye, located within the borders of the Maçka district in Trabzon province, was selected as the study area for this research (Figure 3). Covering an area of 4,600 hectares, Altındere Valley NP is distinguished by the historical Sümela Monastery located within its boundaries, as well as its rich vegetation, wildlife diversity, and intriguing geomorphological structure. Due to its high landscape values and recreational opportunities, the area was aanounced as a national park under the National Parks Law No. 2873 by the Council of Ministers' decree No. 87/12097 on September 9, 1987 (DKMP, 2020).

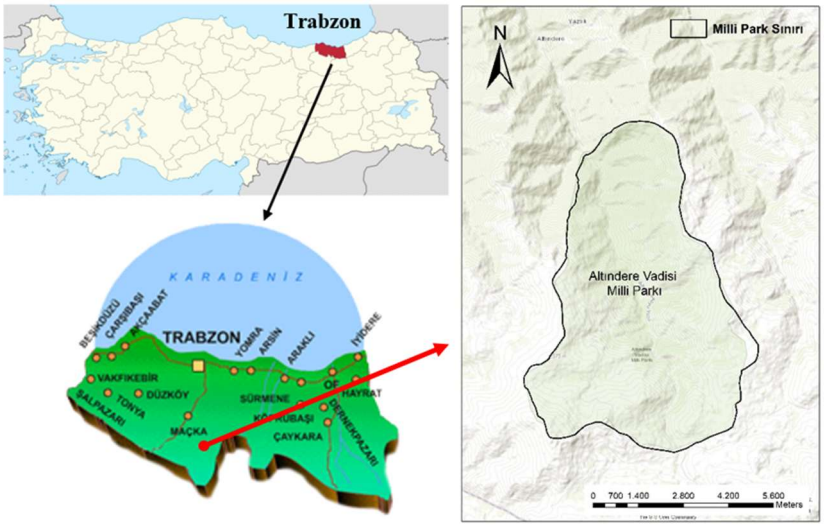

Figure 1. Map of the research area.

2.2. Data Sources and Calculation of Ecosystem Services

The spatial and temporal data forming the basis of the linear programming model used in the study were obtained from the forest management plan desgined for Altındere Valley NP prepared in the year 2020. Yield tables were utilized for the forest dynamics data required for a 50 year planning horizon spanning a total of 185 stand types and 5 periods and an addional set aside alternative. The physical quantities of the ecosystem services to be optimized in the model were calculated using the following methods:

Timber Production: The periodic allowable cut amounts of the stands were determined using management plan data and yield tables.

Carbon Storage: The carbon storage capacity in forest areas was calculated separately for five distinct carbon pools (above-ground biomass, below-ground biomass, dead wood, litter, and soil organic matter), and the total carbon amount in the area was determined by summing these pools.

Soil Loss: To determine the amount of soil erosion in the study area, the model developed by Mısır (2001), which is based on the basal area stand parameter, was utilized. This model was chosen because it was developed for the nearest location to Altındere Valley NP with a similar tree species composition.

Water Production: Calculations were performed using the relevant water production equation developed by Mısır (2001) for the nearest area with similar characteristics, accurately reflecting the hydrological capacity of the basin.

2.3. Economic Valuation Approaches

The economic values of the ecosystem services, whose physical quantities were determined, were converted into monetary terms using various valuation methods accepted in the literature:

Timber Production Value: Calculated using the market price method.

Carbon Sequestration Value: Priced based on Voluntary Carbon Market (VCM) values.

Soil Conservation Value: The value of preventing soil erosion was determined using the replacement cost method and the market price method.

Water Production Value: The value of the water obtained from the area was determined using its market price.

Net Present Value (NPV) Discount Rate: To calculate the present value of cash flows over time, a 3% discount rate, which is generally accepted in forestry practices in Turkey, was adopted as the baseline (Geray and Çörekçioğlu, 1978; Şahin, 1992; Ünal, 1990; Korkmaz, 2001; Daşdemir, 2018).

2.4. Mathematical Model Formulation

A linear programming (LP) model was established to ensure the sustainable management of ecosystem services (Başkent, 2011). The formulated LP model essentially consists of two main components: the objective function and the constraint equations.

2.5. Developed Strategies and Model Solution

Following the formulation of the mathematical model, a total of 5 alternative planning strategies (STR1-STR5) were developed in accordance with the objective functions presented in Table 1, by incorporating site-specific environmental and economic constraints.

Tablo 1. Objectives and constraints of the determined strategies

Strategies	Objective Function	Constraints
STR1	Maximization of Total NPV	- Represents the total amount of harvested timber (m^3/ha) (TH) >=1540, - Represents the total water yield (tons/ha) (TW)>=10000 - Even flow allowable cut (20%) - Even flow regenerated area ≤(20%)
STR2	Maximization of Carbon Sequestration	-TH>=1540, -TW>= 10000 - Even flow allowable cut ≤(20%) - Even flow regenerated area (20)
STR3	Minimization of Soil Loss	-TH>=1540, -TW>= 10000 - Even flow allowable cut ≤(20%)

		- Even flow regenerated area ≤(20%)
STR4	Maximization of Timber Production	-TW>= 10000 - Even flow allowable cut ≤(20%) - Even flow regenerated area ≤(20)
STR5	Maximization of Timber Production NPV	-TW>= 10000 - Even flow allowable cut ≤ (20%) - Even flow regenerated area ≤(20%)

TH= Total harvest (m^3); TW=Total water (m^3); TS=Total soil loss (tones)

The equations belonging to these 5 developed alternative planning strategies were integrated into the LINDO optimization software and solved, and the flow of ecosystem services over time was simulated for each strategy.

3. RESULTS

The results derived from the model solution are presented in the following subsections.

3.1. Soil Loss

Minimum soil loss was observed in STR3 with 17,924 tons, which perfectly aligns with its primary objective, whereas the maximum soil loss was yielded in STR4 with 78,382 tons (Figure 2). The existence of the highest soil loss in STR4 can be attributed to its main objective—the maximization of timber production—which consequently projects a substantial harvesting volume in the area. In other words, while the total timber production over the 50-year planning horizon was projected at 178,638 m³ in STR3, it was determined that this amount was planned to be approximately 2.7 times higher in STR4, reaching 484,569 m³. Therefore, it can be considered an expected outcome that an increase in soil loss occurs in parallel with the increased timber production volume in STR4.

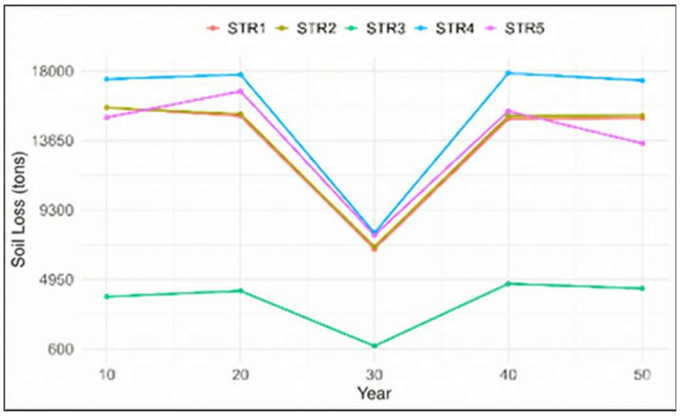

Figure 2. Soil loss change over the 50-year planning horizon according to the strategies

3.2. Water Production

It is observed that the minimum water yield occured in STR3. Considering that the primary objective of STR3 is the minimization of soil loss, it is evident that the model satisfies this condition by generating the lowest possible output, specifically by operating at the lower bound constraint of 10,000 m³ set for water yield. Conversely, the maximum water yield is determined to be in STR4 with 39,731 m³. Furthermore, it is noted that the water yield values in the remaining three strategies follow a similar trend and remain close to one another.

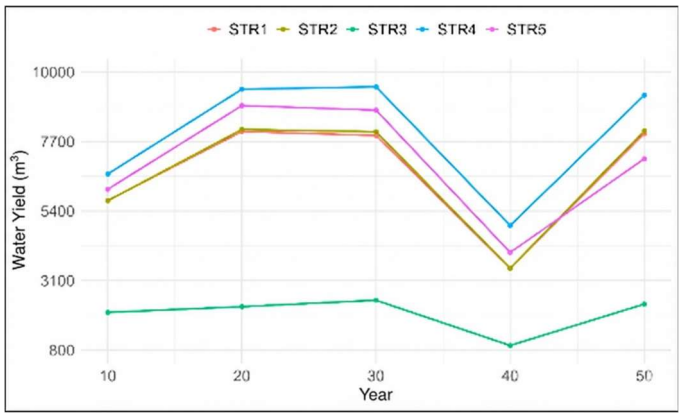

Figure 3. Water yield over the 50-year planning horizon according to the strategies

3.3. Carbon Storage

The maximum carbon storage obtained in STR2 with 1,104,959 tons, which perfectly aligns with its primary objective. Conversely, STR3, with 233,918 tons, was determined to be the strategy with the lowest carbon accumulation. It can be stated that this outcome emerges because the model developed under this strategy—which aims to minimize soil loss—attempts to reduce soil erosion on the one hand, while simultaneously striving to satisfy the constraints for water yield and timber production on the other.

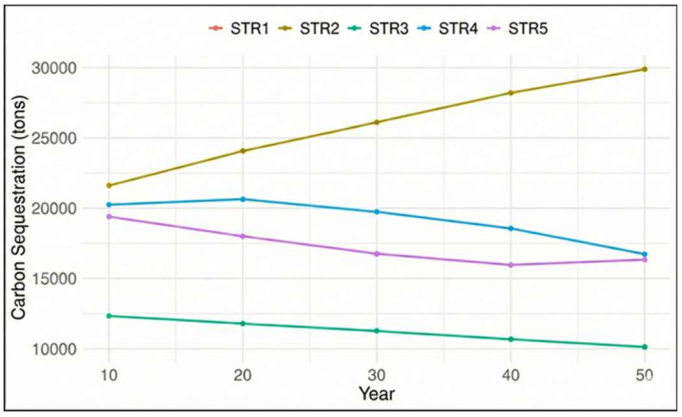

Figure 4. Carbon storage change over the 50-year planning horizon according to the strategies

3.4. Timber Production

Evaluating the obtained data, it was determined that the maximum timber production yielded in STR4 with a harvesting volume of 484,569 m³, which perfectly aligns with its primary objective. Conversely, the minimum production volume was observed in STR2, which aims to maximize carbon storage, with 103,469 m³ (Figure 5). The reason for this outcome can be attributed to the necessity of generally leaving the existing standing trees in the area for longer periods in order to maximize carbon accumulation. Consequently, it can be stated that this requirement leads to a decrease in the annual timber harvest volume, accompanied by the restriction of harvesting activities and a reduction in regenerated areas. Similarly, when considering regenerated areas, it is observed that those areas in STR2 throughout the 50-year planning horizon remained considerably smaller compared to those in STR4.

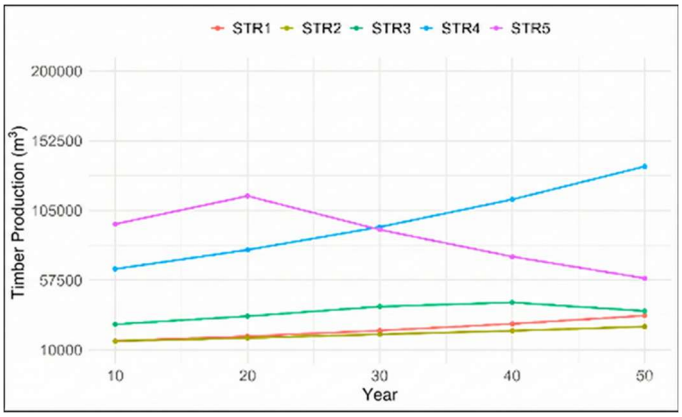

Figure 5. Timber production change over the 50-year planning horizon according to the strategies

3.5. Regenerated and Afforested Areas

When evaluating the strategies over the 50-year planning horizon, it was determined that STR4 had the highest regenerated area with a total of 979 ha, whereas STR2 had the lowest with only 46 ha. Considering that the primary objective of STR4 is to maximize timber production, possessing a large regenerated area emerges as an expected outcome. In contrast, since STR2 targets the maximization of carbon sequestration, it can be stated that it focuses on preserving the existing standing volume as much as possible by minimizing the regenerated areas.

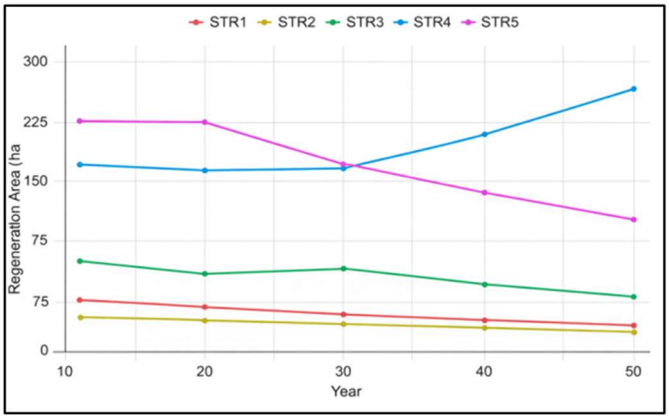

Figure 6. Regeneration area change over the 50-year planning horizon according to the strategies

3.6. Total Net Present Value (NPV)

In determining the total NPV, the economic cost associated with soil loss was included as a negative input in the total economic value calculations. Within this scope, it was found that the strategy with the highest total NPV was STR1, with 1,449,534,000 TL, which aligns with its primary objective. The strategy with the minimum NPV was determined to be STR3, aiming for the minimization of soil loss, with a value of 443,093,400 TL. The second ranked strategy with the highest NPV value was STR2, which targets the maximization of carbon sequestration, with a value of 1,447,125,000 TL. Furthermore, it is observed that the variations of STR1 and STR2 throughout the periods follow a similar pattern across all strategies (Figure 7).

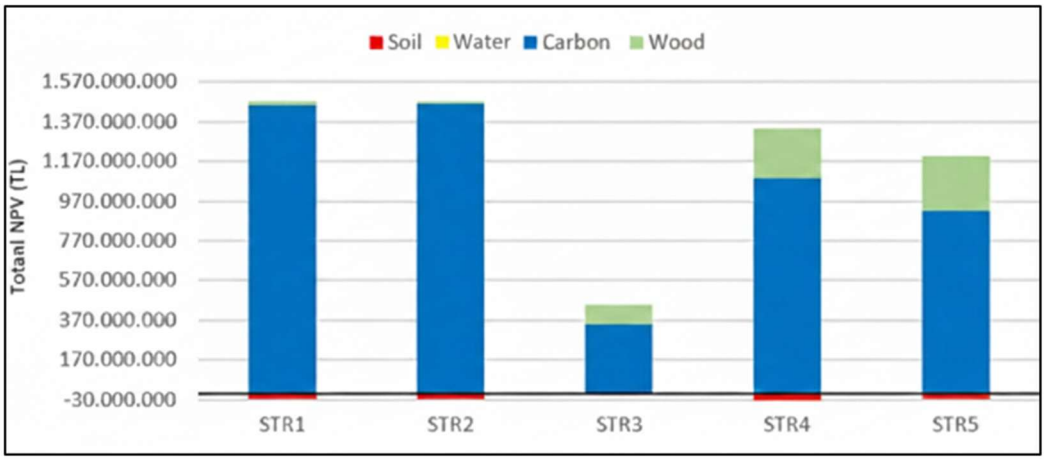

Figure 7. Total NPV change according to the strategies

When comparing STR5, which aims to maximize the NPV of timber production, with STR1, maximizing the total NPV of four functions, it was found that the total NPV in STR5 was 1,168,317,000 TL. This value is 331,217,000 TL lower than the total NPV obtained from STR1 (1,449,534,000 TL). In other words, the net income derived from simultaneously maximizing the total NPV of the four functions was found to be 28.35% higher than the income obtained from the strategy focusing solely from timber production maximization. Furthermore, it is noteworthy that the highest economic value under STR1 was achieved by projecting approximately 73% less timber production amounts compared to the timber production volume determined under STR5.

The analysis results obtained through the linear programming model reveal that while total income remains at a certain level in strategies aiming only for timber production maximization, the total economic return is significantly higher in strategic approaches where other functions are also taken into account.

4. CONCLUSION

Model outputs indicate that the results of the strategies aiming to maximize total NPV (STR1) and maximize carbon sequestration (STR2) are similar. Likewise, it can be stated that the strategies aiming to maximize amount of timber production (STR4) and timber production NPV (STR5) follow a similar trend. However, the analyses show that the strategy aiming to maximize the total economic value (total NPV) yields a higher total economic value compared to the strategy developed solely for maximizing timber production NPV. Notably, STR1, which had the highest total economic value, achieves this by yielding only one-fourth of the timber production volume compared to STR5. This situation demonstrates that forest resources cannot be reduced to market-based products alone; on the contrary, indirect use value components contribute significantly more to the economic integrity of the area. In other words, the findings show that a holistic evaluation of the economic value of ecosystem services transcends the traditional timber-oriented approach.

All these results clearly demonstrate that traditional forest management approaches need to be reconsidered. Beyond functions that generate direct income such as timber production, the monetization of ecosystem services and the integration of these values into strategic planning both maximize economic benefit and contribute significantly to the sustainable management of protected areas. Furthermore, this emphasizes the necessity for decision-makers to shift from one-dimensional production-oriented planning to multi-functional integrated planning approaches in resource allocation and management strategy selection.

It is observed that the integration of the obtained results into forest management plans enables the evaluation of not only volumetric timber production targets but also non-wood benefits as measurable and optimizable outputs during the planning process. This integration ensures the transformation of management plans from one-dimensional economic focuses into multi-dimensional, value-oriented strategic management tools. Moreover, such optimization-based economic analyses integrated into the planning process contribute to a more accurate estimation of the total benefit possessed by forest ecosystems, more effective resource allocation, and the implementation of ecosystem-based management principles. Additionally, by calculating the monetary equivalents of ecosystem services and incorporating them into management plans—which traditionally produce forests based on time and space-oriented

physical timber production—these plans will serve as a driving force in attaining the character of comprehensive forest enterprise plans. However, considering the limitations of the current study, it is essential that future planning models be expanded to incorporate a broader range of ecosystem services to capture the full spectrum of forest values.

Acknowledgements

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Economic Valuation of Carbon Storage in Protected Areas: A Case Study of Altındere Valley National Park

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Abstract

In the global effort to mitigate climate change, the economic valuation of carbon sequestration has become a cornerstone of sustainable management for protected areas. This study investigates the economic significance of carbon storage services, focusing on Altındere Valley National Park as a crucial carbon sink. To ensure a robust economic assessment, carbon stocks were quantified across five distinct pools: above-ground biomass, below-ground biomass, deadwood, litter, and soil organic matter. Carbon storage of the Altındere Valley NP calculated on the basis of species specific wood density, biomass expansion factors or root to shoot ratios applied to standing volume of the stands using previously conducted studies. In the economic valuation; a comparative valuation approach was used, proposed by the European Forest Institute as; Social Cost of Carbon and Market Valuation. The total carbon storage was determined to be 160,859.90 tons, equivalent to approximately 590,355 tons of CO_2. From a management and economics perspective, these physical stocks were converted into monetary values through a triple-valuation framework, incorporating the Social Cost of Carbon, Compliance Carbon Market prices, and Voluntary Carbon Market rates. The findings suggest that integrating carbon asset management into the strategic planning of protected areas can unlock innovative financing mechanisms, such as Payments for Ecosystem Services (PES). This study provides a scientific foundation for policy-makers to recognize national parks not as cost centers, but as high-value economic assets essential for climate-resilient growth and green marketing opportunities within sustainable tourism.

Keywords: Environmental Economics, Natural Capital, Carbon Pricing, Ecosystem Services, Altındere Valley National Park.

1. INTRODUCTION

Climate change remains one of the most critical challenges of the 21st century, necessitating urgent global actions to enhance carbon sequestration and storage capacities of terrestrial ecosystems. Forests, as primary terrestrial carbon sinks, play a fundamental role in global carbon cycling by sequestering atmospheric CO_2 into biomass and soil (Tolunay, 2011). However, the traditional economic perspective has historically prioritized the provisioning services of forests, such as timber production, often overlooking the immense value of regulating services like climate stabilization (Costanza et al., 2014).

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In recent years, the economic valuation of ecosystem services has emerged as a crucial framework for integrating natural capital into national and international policy-making. Assigning monetary values to carbon allows for a comprehensive comparison between conservation and extractive land uses (Isbell et al., 2015). This is particularly vital for protected areas, whose full economic value is often not recognized despite their critical role in maintaining high-density vegetation carbon storage that has accumulated over decades (Davies et al., 2011).

The literature indicates that the economic value of carbon shows significant variation depending on the chosen pricing instrument, ranging from the Social Cost of Carbon (SCC) to the prices observed in voluntary and compliance carbon markets (World Bank Group, 2015).

Protected areas like Altındere Valley National Park, characterized by their old-growth stands, represent unique reservoirs of biological and economic wealth that require specialized valuation approaches. This study aims to quantify and economically value the carbon storage service of Altındere Valley National Park (AVNP) across five distinct carbon pools (above-ground, below-ground, deadwood, litter, and soil). By employing a triple-valuation framework, the research seeks to demonstrate the financial significance of maintaining these high-density carbon stocks. Furthermore, the study explores how internalizing these values can support innovative conservation financing, such as Payments for Ecosystem Services (PES), providing a scientific foundation for shifting the perception of national parks from mere conservation sites to high-value economic assets. Forestry sector face similar challenges in accounting forest values to use in both economical and modelling aspects for current and future requirements of the society. Forest managers and researchers are aware of the needs but often find it difficult to identify detailed information on targeted solutions that would deliver direct and tangible effective outcomes.

2. MATERIALS AND METHODS

2.1. Study Area

Altındere Valley National Park (NP), one of the 50 national parks in Türkiye, located within the borders of the Maçka district in Trabzon province, was selected as the study area for this research (Figure 1). Covering an area of 4,600 hectares, Altındere Valley NP is distinguished by the historical Sümela Monastery located within its boundaries, as well as its rich vegetation, wildlife diversity, and intriguing geomorphological structure. Due to its high landscape values and recreational opportunities, the area was announced as national park status under the National Parks Law No. 2873 by the Council of Ministers' decree No. 87/12097 on September 9, 1987 (DKMP, 2020).

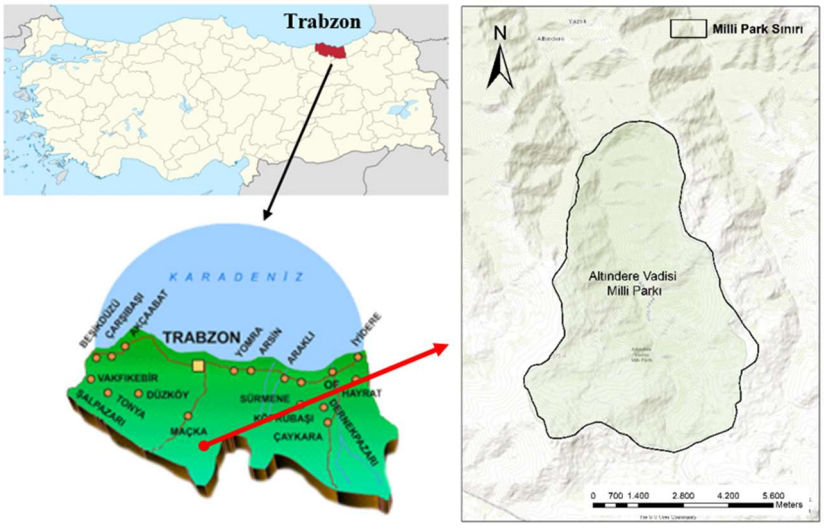

Figure 1. Spatial location of the research area.

2.2. Carbon Stock Assessment and Calculations

Following Türkiye's commitment to international climate agreements, carbon accounting methodologies have evolved significantly. In this study, carbon storage was quantified across five distinct carbon pools in accordance with international standards and localized coefficients:

1. Above-ground biomass
2. Below-ground biomass
3. Deadwood
4. Litter
5. Soil organic matter

The calculation framework was based on the FRA 2010 (Global Forest Resources Assessment) guidelines and utilized Biomass Expansion Factors (BEF) specifically developed for the regional forest types by Tolunay (2011) and Tolunay & Çömez (2008). To ensure high precision, species-specific carbon coefficients derived from previous domestic and international literature (As et al., 2001; IPCC, 2003; Tolunay, 2013; Tolunay, 2019) were integrated into the methodology.

2.3. Economic Valuation Framework

To translate physical carbon stocks into economic data, a comparative valuation approach was employed. While forest carbon benefits can be estimated using various metrics, this study utilized a triple-scenario framework as proposed by the European Forest Institute (EFI, 2014):

Social Cost of Carbon (SCC): To reflect the long-term economic damage avoided by carbon sequestration.

Market Valuation: Incorporating both Compliance and Voluntary Carbon Market prices to assess the park's potential in carbon trading schemes.

By integrating these ecological and economic methodologies, the study establishes a comprehensive value for the natural capital of Altındere Valley NP.

3. RESULTS

3.1. Carbon Stock Assessment and Calculations

To establish a scientific foundation for the economic valuation of Altındere Valley National Park, the area's ecological assets were quantified based on their physical carbon storage capacity. In this context, the carbon sequestration levels for dominant species such as *Picea orientalis*, *Pinus sylvestris*, *Alnus glutinosa* and *Fagus orientalis* were estimated utilizing established coefficients from the literature (As et al., 2001; IPCC, 2003; Tolunay, 2013; Tolunay, 2019) (Table 1).

Table1. Wood density, BEF, and BCEF values of the tree species in the study area

Tree Species	Basic Wood Density (t/m^3)	BEF (Biomass Expansion Factor)	BCEF (Biomass Carbon Expansion Factor) (t/m^3)
Pinus sylvestris	0.426	1.247	0.531
Picea orientalis	0.358	1.132	0.405
Alnus glutinosa	0.407	1.103	0.449
Fagus orientalis	0.530	1.305	0.692
Conifers	0.446	1.212	0.541
Broadleaves	0.541	1.310	0.709

Below-ground biomass was estimated by multiplying the calculated above-ground biomass by the root-to-shoot (R) ratio. In this context, the coefficients developed in the 'Agriculture, Forestry, and Other Land Uses' (AFOLU) guidelines for temperate forests (IPCC, 2006) were utilized to ensure methodological consistency (Table 2).

Table 2. Root-to-shoot (R) ratios and carbon fraction (CF) coefficients for different vegetation types in temperate forests provided in AFOLU guidelines (IPCC, 2006)

Vegetation Types	Above-ground Biomass (t/ha)	Root-to-shoot ratio (R)	Carbon Fraction (CF)	Deadwood Factor
Conifers	<50	0,40	0,51	0,01
	50-150	0,29		
	>150	0,20		
Broadleaves	<75	0,46	0,48	
	75-150	0,23		
	>150	0,24		

The deadwood biomass was determined by multiplying the above-ground biomass by a factor of 0.01, and the resulting value was then multiplied by the deadwood-specific carbon fraction (0.47) to calculate the total deadwood carbon stock in the area.

The amount of carbon stored in the litter and soil organic matter (SOM) was estimated by multiplying the total forest area by country-specific carbon content values for litter or soil. These country-specific coefficients for different tree species groups in both productive and degraded areas are presented in Table 3 (Tolunay and Çömez, 2008).

Table 3. Country-specific litter carbon and soil organic carbon (SOC) content by vegetation type and site productivity (t/ha)

Vegetation Type	Litter Carbon (t/ha)		Soil Organic Carbon (t/ha)	
	Productive	Degraded	Productive	Degraded
Coniferous	7.46	1.86	76.56	19.14
Broadleaved	3.75	0.93	84.82	21.20

Furthermore, data regarding various stand parameters, such as growing stock volume, were obtained from the current forest management plan prepared for Altındere Valley NP in 2020. Since the existing plan reflects the conditions of the area as of 2020, the stand volumes were projected for 2023—the baseline year selected—by utilizing the annual increment values provided in the same plan.

The total carbon storage of Altındere Valley NP was calculated individually for five distinct carbon pools: above-ground biomass, below-ground biomass, deadwood, litter, and soil organic matter, using the relevant coefficients presented in Tables 1, 2, and 3. Consequently, the total carbon storage of Altındere Valley NP was determined to be 160,859.90 tons.

3.2. Determination of the Economic Value of Carbon Sequestration Based on Different Valuation Methods

Social Cost of Carbon (SCC): Various models have been developed to estimate the social cost of carbon, with projections extending to 2050 based on different discount rates. An analysis of these studies indicates that the average social cost of carbon for the year 2023 is estimated at $44/tCO$_2$ (IWG, 2016).

Market Value of Carbon: The market valuation was assessed under two distinct categories:

Voluntary Carbon Market: According to Ecosystem Marketplace, the average voluntary carbon market value for the "Forestry and Land Use" sector in 2023 was determined to be $9.72/tCO$_2$ (Procton, 2024).

Compliance Carbon Market: The official report titled "Report on the Functioning of the European Carbon Market," published by the European Commission in 2024, stated that the average price of carbon allowances (EUA) within the European Union Emissions Trading System (EU ETS) in 2023 was approximately €83.60 ($89.45) per ton (European Commission, 2024).

Based on the assessment, the total carbon storage in the forests of Altındere Valley National Park for the year 2023 was estimated at 160,859.90 tons. This amount is equivalent to 590,355.83 tons of CO_2 (calculated using the 3.67 conversion factor), as presented in Table 4. It was determined that the study area maintains an average carbon stock of 128.34 tonnes per hectare. Başkent (2021) calculated the carbon stock of an over-mature Çkd1 stand as 119.84 tC/ha, classifying it as 'medium.' The fact that the overall average for Altındere Valley National Park (128.34 tC/ha) exceeds even this specific value indicates a significantly higher biomass accumulation. This discrepancy is primarily attributed to the area's national park status, which ensures protection from anthropogenic interventions and allows the ecosystem to reach a level of maturity that effectively traps carbon as a long-term 'stock' rather than a temporary flux.

Table 1. Economic value estimation of carbon stocks in Altındere Valley NP

Valuation Method	Carbon Storage (ton)	CO_2 Equivalent (ton)	Unit Price ($/ton CO_2)	Economic Value ($)	Economic Value (TL)
Social Cost of Carbon	160,859.90	590,355.83	44	25,975,656.52	615,103,546.4
Voluntary Carbon Market	160,859.90	590,355.83	9,72	5,738,258.67	135,881,965.3
Compliance Carbon Market	160,859.90	590,355.83	89,45	52,807,328.99	1,250,477,550

Economic valuation of the carbon storage ecosystem service within Altındere Valley NP yielded varying results depending on the pricing mechanism employed: the social cost of carbon, voluntary market values, and compliance market values resulted in total valuations of $25.98 million, $5.74 million, and $52.81 million, respectively. These figures correspond to unit values of $5,646.88/ha, $1,247.45/ha, and $11,479.85/ha, highlighting the significant economic potential of the park's carbon stocks under different market scenarios.

The economic valuations obtained for Altındere Valley NP indicate a significantly higher economic potential compared to similar studies in both national and international literature. In the Turkish context, research conducted in the Bolu Forest Regional Directorate utilized the Social Cost of Carbon (SCC) method and determined an economic value of $178.45/ha (World Bank Group, 2015). Similarly, the carbon sequestration function of the Düzlerçamı forests was estimated at $62.23/ha/year for 2013 based on shadow pricing (Balkız, 2016). International literature reflects a similar trend of lower unit valuations. In Swedish forests, a study using shadow prices found the economic value of carbon sequestration to be $23.56/ha (Gren & Amuakwa-Mensah, 2018). In the Brazilian Amazon, the opportunity cost method yielded an estimated value of approximately $2,026/ha (Diniz et al., 2018). Furthermore, research in Colombia utilizing Net Present Value (NPV), benefit-cost ratio, and internal rate of return methods reported values ranging from a minimum of $11.5/ha/year to a maximum of $81.5/ha/year (Mena-Mosquera & Andrade, 2021).

The primary factor underlying these dramatic discrepancies is the methodological approach employed in this study. While the vast majority of existing literature reflects "flux (sequestration)" values—representing the amount of carbon captured by forests from the atmosphere on an annual basis—this study is based on "storage (stock)" values, which represent the total carbon accumulated within the site over decades. This shift in focus from annual performance to the total accumulated carbon capital is the fundamental reason why the unit values obtained are substantially higher than those in flux-oriented studies.

Furthermore, the "National Park" status of Altındere Valley NP and the resulting high density of old-growth forest stands provide the essential ecological justification for such elevated carbon stock values. The minimal anthropogenic intervention afforded by this protection status has maximized biomass accumulation, pushing the carbon density per hectare (128.34 tC/ha) well above the average for Türkiye and many of the compared study areas. The function of these old and mature stands as massive "carbon banks" rather than mere carbon sinks provides the scientific basis for the economic value of $11,479.85/ha reached under the compliance market scenario.

In conclusion, this high storage capacity, coupled with recent price increases in carbon markets, clearly demonstrates that Altındere Valley NP is a critical economic and ecological asset that must be preserved in the fight against climate change.

4. CONCLUSION

This study demonstrates that the economic valuation of carbon storage as an ecosystem service is not merely a technical calculation but a strategic necessity for modern protected area management. By assigning a monetary value to the carbon sequestered within Altındere Valley NP, this research transforms an intangible environmental benefit into a tangible economic asset. This shift in perspective allows protected areas to be recognized as vital components of a nation’s natural capital, rather than just cost centers for conservation.

The ecological maturity of Altındere Valley NP—sustained by its long-term protected status and the resulting prevalence of old-growth forest stands—functions as a resilient 'carbon bank.

In conclusion, internalizing the economic worth of these carbon reservoirs into policy-making is essential for achieving climate-resilient growth. This study provides a robust scientific framework for decision-makers to justify conservation funding and to explore innovative financing mechanisms, such as Payments for Ecosystem Services (PES). Recognizing the dual role of national parks as both biological havens and high-value economic assets is a critical step toward a sustainable green economy and the long-term protection of our global climate security.

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Assessing Circular Economy Development in Serbia and European Countries using PROMETHEE method

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Abstract

This study assesses the level of circular economy (CE) development in Serbia and 26 European countries using the PROMETHEE II multi-criteria decision-making method. The analysis is based on 2023 data obtained from the Eurostat database, ensuring methodological consistency and comparability across countries. Five criteria were selected to reflect the multidimensional character of circular economy performance. The PROMETHEE II outranking approach was applied to compute positive, negative, and net preference flows (φ), enabling a comprehensive ranking of national CE performance. The results reveal substantial disparities among European countries. Sweden achieved the highest net flow value, ranking first overall due to its strong and balanced performance across all five criteria. In contrast, Serbia recorded a net preference flow of φ = −0.22, indicating below-average performance relative to the observed European countries and highlighting structural gaps in resource efficiency and circular material use. The findings demonstrate the effectiveness of the PROMETHEE method as a transparent and robust decision-support tool for benchmarking circular economy development and identifying priority areas for policy intervention aimed at accelerating the transition toward sustainability.

Keywords: Circular Economy, Sustainability, PROMETHEE Metdhod, Multicriteria Decision Making, Waste Management

1. INTRODUCTION AND LITERATURE REVIEW

The circular economy (CE) is a modern economic model that seeks to replace the traditional linear “take-make-dispose” approach with a more sustainable system based on recycling, reuse and waste reduction. According to projections of the UN environment program, global resource demand will increase three times by 2050, ceteris paribus. Under the "business as usual" scenario, putting it bluntly, we consume annually over 1.5 Earth's worth of all resources. That means we shall need our four planets just to meet ends with the current demand until 2050. Resources are limited, but not our appetites for them (Fan and Fang, 2020). Therefore, a circular economic system concentrates on forming the resource flow loop to achieve sustainability (van Capelleveen et al., 2021; Dantas et al. 2020; de Sousa et al. 2018). Circular economy offers a paradigm change from a linear economy which highly depends on the consumption of

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resources that end up in landfills after being used, that is not economically, ecologically and socially sustainable in the long run (Busu, 2019). The main aim of the circular economy development, which is a segment (area) of green economy as a broader concept, is to minimize the disposal of products that are no longer in use to waste landfills and to maximize their conversion into resources for the production of new goods (Kirchherr et al. 2017). The characteristics of the circular economy are that it is restorative, based on renewable energy, minimizes or eliminates the use of toxic chemicals and reduces or eliminates waste by careful design of materials, final products, production systems and business models (Borrello et al. 2020; Chauhan et al. 2019). The UN Sustainable Development Agenda 2030 contains 17 goals focusing on poverty reduction, education, social and health care, economic growth and tackling climate change. There are three groups of benefits of the circular economy model: environmental benefits, economic benefits and benefits for businesses (Diemer, A. and Dierickx, F., 2020; Gravagnuolo et al. 2019).

The alternative to the linear economy, embodied in the "take-make-dispose" model to one that aims to reduce waste and maximizes the utilization of resources. The waste management will be very important as well in the transformation into a circular economy (CE), with an aim to keep and use products and materials economically, minimizing waste and resource use (Busu, 2019; Kerdlap et al. 2019). Waste management is crucial for a circular economy, which targets to reduce material use and waste, ensuring that resources are kept and use as much time as possible (Giannakitsidou et al., 2020; Ranta et al. 2021, Fatimah et al. 2020). In our current linear economy, we extract resources from the Earth, use them to make products, and then dispose of them as waste. However, in a circular economy, we aim to create closed-loop systems where waste is treated as a valuable resource and reused, recycled, or repurposed. This requires a shift towards circular waste management systems that prioritize the reuse and recycling of materials (van Capelleveen et al., 2021; Turner et al., 2019). Circular waste management involves several strategies, including reducing waste generation and designing products for reusability and recyclability. Recycling and composting are also essential aspects of circular waste management, as they allow materials to be used again instead of ending up in landfills or incinerators. The transition towards a circular economy is closely linked with sustainable production, waste management, and recycling. Conceptual analysis has shown that there is a strong linkage between the circular economy and these factors, indicating that improving waste management and recycling practices is a key step toward achieving a circular economy. Current research shows that there is a positive trend in the improvement of implementation and evaluation of the effects of Circular Economy, but it is still deficient (Popović et al., 2022).

According to Eurostat data, the annual amount of waste in Serbia has increased more than three times since 2020, and according to the latest data from 2022, Serbia is the fourth country in Europe in terms of waste volume, with 176,879,068 tons of waste per year. The fact that our country generates over 100,000,000 tons of waste per year more than the European average indicates an alarming situation. Of the total amount of waste in Serbia in 2022, only 1% will be waste generated by households. In order to apply the basic principles of sustainable development, it is necessary to provide all stakeholders with the recommendations to improve the transfer towards a circular economy at the national and local levels, including groups of companies, households and individuals. The circular economy model focuses on reducing waste, reusing resources, and ensuring that products and materials remain in use for as long as possible. Digitalization, through various technologies and data analytics, has the potential to enhance the efficiency and effectiveness of circular economy practices (Parida et al. 2019; Kintscher et al. 2020; Antikainen et al. 2018). By harnessing the power of digital solutions, businesses can track resources, optimize production, and ensure transparency, which accelerates the transition to a sustainable economy.

In this paper the development of circular economy in Serbia will be compared with the other European countries using PROMETHEE method for multi-criteria decision making. The following section describes methodology and data applied in the analysis. In the third section results and discussion are presented, while conclusions and guidelines for further research are shown at the end of the paper.

2. METHODOLOGY AND DATA

The Preference Ranking Organization METHod for Enrichment of Evaluations (PROMETHEE) is an outranking-based multi-criteria decision-making (MCDM) method originally developed by Brans in the early 1980s and further elaborated by Brans and Mareschal (1984, 2005). The method is based on pairwise comparisons of alternatives across multiple weighted criteria and employs specific preference functions to quantify the degree to which one alternative outranks another. For each alternative, PROMETHEE calculates positive and negative preference flows, and a net preference flow is derived to obtain a complete ranking (PROMETHEE II) or partial ranking (PROMETHEE I). The incorporation of indifference and preference thresholds allows the method to capture the decision-maker’s perception of differences between alternatives, thereby enhancing flexibility and transparency in complex decision contexts. Due to its ability to integrate quantitative and qualitative criteria simultaneously, PROMETHEE has become widely

applied in sustainability and circular economy (CE) assessments. In circular economy research, PROMETHEE has been used to evaluate and rank waste management strategies, benchmark national CE performance, and prioritize circular supply chain configurations. For example, Erceg and Margeta (2019) applied PROMETHEE to select optimal food waste management options within a circular economy framework. Stanković et al. (2021) integrated principal component analysis (PCA) with PROMETHEE to assess circular economy indicators across European Union countries. Cabo et al. (2024) used PROMETHEE within a multi-criteria framework to optimize circular pathways in plastic chemical recycling, while De Luca et al. (2023) applied PROMETHEE II to evaluate circular supply chain alternatives under sustainability criteria. Furthermore, Longsheng and Shah (2025) proposed a hybrid ANP–ANN and PROMETHEE-GAIA framework to assess regional circular economy performance. These applications demonstrate the methodological robustness, adaptability, and growing relevance of PROMETHEE as a decision-support tool for circular economy evaluation and sustainable development planning.

The data were retrieved from the Eurostat database for the year of 2023 and the sample of 26 countries has been determined based on the availability of data. As presented in the Table 1. countries will be compared using five CE indicators as criteria: Generation of municipal waste per capita, Recycling rate of municipal waste, Greenhouse gases emissions from production activities, Raw material consumption and Share of renewable energy in gross final energy consumption. The second and the fifth criterion should be maximized, while the rest minimized. Equal weights were assigned to all criteria.

Table 1. Input data

Countries and criteria	Generation of municipal waste per capita (minimize)	Recycling rate of municipal waste (maximize)	Greenhouse gases emissions from production activities (minimize)	Raw material consumption (minimize)	Share of renewable energy in gross final energy consumption by sector (maximize)
Belgium	688.00	55.80	6777.53	117535.00	14.67
Bulgaria	490.00	16.70	6364.05	125216.00	23.15
Czechia	538.00	43.50	7621.48	194377.40	18.56
Denmark	759.00	46.60	12609.78	132094.10	43.73
Germany	613.00	68.70	6543.40	1028254.00	21.51
Estonia	373.00	37.90	7258.54	31903.62	40.95
Greece	523.00	17.40	6716.90	115090.50	25.27
Spain	465.00	41.40	4480.58	448876.50	24.98
France	527.00	40.30	4508.32	944830.70	22.46
Croatia	475.00	36.00	4889.09	59965.57	28.09
Italy	489.00	50.80	5017.33	582021.50	19.18
Cyprus	653.00	16.00	7484.62	20275.84	20.21
Lithuania	446.00	49.30	7199.58	57800.32	31.93
Luxembourg	718.00	56.50	11684.09	18608.48	14.31
Hungary	429.00	33.40	4671.45	141535.00	17.12
Malta	603.00	17.40	9085.50	6291.54	15.44
Netherlands	468.00	58.40	7795.20	140111.07	17.59
Austria	782.00	62.80	5944.71	183948.10	41.60
Poland	367.00	27.60	8694.35	561863.80	16.65
Portugal	505.00	30.60	4373.51	163258.50	35.15
Romania	305.00	12.40	4415.45	554349.30	25.76
Slovenia	517.00	59.80	5202.77	36601.85	25.07
Slovakia	472.00	50.30	5411.69	83320.78	16.99
Finland	468.00	44.80	7058.11	214121.10	50.78
Sweden	392.00	39.40	3935.22	235171.40	66.39
Serbia	467.00	15.20	8001.02	142943.58	25.43

3. RESULTS AND DISCUSSION

PROMETHEE method was used in order to obtain ranking between the selected European countries by using the circular economy indicators. The positive outranking flow (phi+) shows how an alternative is outranking all the others. Higher flows (phi+) mean better alternatives. The negative outranking flow (phi-) expresses how an alternative is outranked by all the others. Lower flows (phi-) suggest better alternatives. The higher the net flow (phi), the better the alternative (Tsiaras et al., 2021.). The analysis was performed in Visual PROMETHEE software and the results are presented in the table 2.

Table 2. Results of PROMETHEE method

Multicriteria flows	Phi	Phi+	Phi-
Sweden	0.44	0.72	0.27
Lithuania	0.37	0.68	0.31
Slovenia	0.37	0.67	0.30
Estonia	0.36	0.67	0.32
Croatia	0.26	0.63	0.37
Spain	0.19	0.58	0.38
Finland	0.18	0.58	0.40
Portugal	0.15	0.58	0.42
Slovakia	0.14	0.55	0.40
Austria	0.11	0.55	0.44
Romania	0.09	0.53	0.44
Hungary	0.05	0.51	0.46
Netherlands	0.00	0.47	0.47
Italy	-0.05	0.46	0.50
Greece	-0.09	0.43	0.52
Bulgaria	-0.10	0.43	0.53
Germany	-0.13	0.43	0.56
France	-0.14	0.42	0.55
Denmark	-0.14	0.43	0.57
Belgium	-0.18	0.40	0.58
Serbia	-0.22	0.36	0.58
Luxembourg	-0.22	0.38	0.60
Cyprus	-0.28	0.34	0.62
Poland	-0.34	0.31	0.66
Malta	-0.38	0.28	0.67
Czechia	-0.46	0.26	0.71

Sweden emerges as the clear leader in the PROMETHEE II ranking. Its high positive flow and very low negative flow indicate that it consistently outperforms most other countries across the circular economy indicators. This suggests a well-integrated circular economy system supported by strong recycling performance, efficient material use, and advanced waste management infrastructure. Lithuania, Slovenia and Estonia also demonstrate strong structural performance. Their rankings reflect balanced outcomes across multiple indicators rather than dominance in only one dimension. These countries likely benefit from mature environmental policy frameworks, industrial symbiosis practices, and high levels of resource productivity. Countries in the middle of the ranking show mixed performance patterns. While they may perform well in certain indicators, inconsistencies across other circular economy dimensions prevent them from reaching the top tier. These countries could significantly improve their ranking through targeted policy interventions focusing on weaker performance areas. The lowest-ranked countries (Czechia, Malta and Poland) exhibit high negative flow values, indicating that they are frequently outranked in pairwise comparisons. This pattern

suggests structural challenges such as lower recycling rates, higher landfill dependency, and less developed circular material use systems. Substantial investment in infrastructure, regulatory reform, and industrial circular integration would be necessary to improve their performance. Serbia is also one of the lowest performing countries, therefore necessary changes in the implementation of CE principles are crucial for further development.

4. CONCLUSION

This study assesses the level of circular economy development in Serbia and 26 European countries using the PROMETHEE II multi-criteria decision-making method. The PROMETHEE analysis highlights a clear structural divide between leading circular economy countries and those requiring systemic reforms. Policymakers in lower-ranked countries may benefit from benchmarking against Denmark, Germany, and Austria to identify transferable best practices. Furthermore, sensitivity analysis could be conducted to evaluate how changes in criteria weights might influence the ranking results.

Unfortunately, underdeveloped awareness of market actors about the importance of the environment and the fight against climate change in general, especially in terms of waste management, and the possibilities of using waste as a raw material in industrial processes, as well as low awareness of waste potential as a raw material for production is current state in Serbia. There is also a lack of a supportive environment that would promote investment in "green" technologies and waste management, and for the application of CE-based business models. This research is specialized to substantially contribute to the development of the circular economy sector in Serbia by addressing the barriers to adopting CE principles in key sectors. It aims to contribute to a sustainable business ecosystem through the identification of key needs and skills gaps in businesses within the main focus areas. The initiative puts a strong emphasis on collaboration with industry and policy makers beyond academia. The research outcomes also aim to democratize the application of CE, therefore opening more avenues for further research and innovations. Moreover, the results will contribute to an increasingly integrated and resilient national and local economy in its transition toward sustainability.

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Communication and Internal Branding as Strategic Management Tools in Private Healthcare

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Abstract

The private healthcare sector operates in an increasingly competitive and quality-driven environment, where service excellence, patient experience, and organizational performance are closely interconnected. Within this context, organizational communication and internal branding constitute critical strategic tools for strengthening internal alignment and enhancing management effectiveness in clinical settings. This study investigates the relationship between organizational communication, internal branding, and employee commitment in private healthcare organizations, based on quantitative data collected from 247 healthcare professionals.Using a structured questionnaire validated through reliability analysis and Confirmatory Factor Analysis, the study examines the extent to which communication practices and internal branding initiatives influence employee commitment. The findings reveal strong and positive correlations among the key variables. Organizational communication demonstrates a strong positive association with employee commitment, while internal branding is also strongly related to employee commitment. Additionally, organizational communication is strongly correlated with internal branding, confirming their interdependent nature. Multiple regression analysis further indicates that both organizational communication and internal branding significantly and positively predict employee commitment, with communication exhibiting a slightly stronger effect.These results empirically support the proposition that structured communication systems and coherent internal branding practices function as complementary strategic management mechanisms in private healthcare environments. By strengthening employee commitment, these internal alignment processes contribute to enhanced service consistency, interdisciplinary collaboration, and the reliable delivery of the organizational brand promise. The study concludes by proposing an integrated managerial framework that aligns communication strategies with internal branding initiatives to promote sustainable performance and competitive advantage in the private healthcare sector.

Keywords: Internal Branding, Health Services, Clinical Settings, Organizational Communication, Management

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1. INTRODUCTION

The private healthcare sector has undergone profound transformation over the past decades, driven by intensified competition, technological advancement, regulatory pressures, and increasingly informed and demanding patients [1]. Unlike public healthcare systems, private healthcare organizations operate within market-oriented frameworks where service quality, patient satisfaction, reputation, and financial performance are tightly interlinked [2]. In such an environment, managerial effectiveness extends beyond clinical excellence to encompass strategic coordination of people, processes, and organizational identity [3]. Communication and branding, traditionally viewed as external, market-facing functions, have thus gained strategic relevance within the internal management of healthcare institutions [4].

Clinical environments are inherently complex organizational systems [5]. They involve multidisciplinary collaboration among physicians, nurses, administrative staff, and management teams, all of whom must operate under conditions of high responsibility, time pressure, and ethical accountability [6]. In these contexts, misalignment, fragmented communication, or unclear organizational values can directly affect service consistency and patient outcomes [7]. Consequently, organizational communication is not merely an operational necessity but a foundational management mechanism that shapes coordination, trust, decision-making quality, and professional culture. Clear communication channels, feedback systems, and shared understanding contribute significantly to reducing uncertainty and strengthening organizational coherence in clinical settings [8].Parallel to the importance of communication, branding within healthcare has traditionally focused on external positioning (reputation building, marketing strategies, and differentiation in competitive markets) [4]. However, contemporary management theory emphasizes that a brand is not solely an external promise but also an internal commitment that must be enacted by employees in daily practice [9]. Internal branding, therefore, plays a pivotal role in translating brand values into employee behaviors, service standards, and patient interactions. In private healthcare organizations, where service quality is inseparable from human interaction, the alignment between declared brand identity and internal organizational culture becomes especially critical.The integration of organizational communication and internal branding represents a strategic convergence that has not been sufficiently explored within the context of private healthcare management. While prior studies have examined communication effectiveness or brand management independently, limited research has addressed how these two domains function synergistically as strategic management tools in clinical environments [10-12]. This gap is particularly relevant given the high-stakes nature of healthcare delivery, where teamwork, trust, and professional accountability are central to performance.

The aim of this study is to examine how organizational communication and internal branding jointly contribute to effective management in private healthcare settings. Specifically, the research investigates their role in fostering staff alignment, enhancing interdisciplinary collaboration, strengthening organizational identity, and ensuring consistency between the brand promise communicated to patients and the actual service experience delivered. By drawing on contemporary theories of internal communication, brand identity, and healthcare management, the study seeks to conceptualize these practices not as isolated administrative functions but as interconnected strategic mechanisms that shape organizational performance.The novelty of this paper lies in its integrative perspective. It proposes a unified analytical framework that positions organizational communication and internal branding as complementary strategic tools within private healthcare administration. Rather than treating communication as a purely informational process and branding as a marketing construct, the study conceptualizes both as managerial levers that influence employee engagement, service quality, and patient trust. Furthermore, it advances a structured managerial framework tailored specifically to clinical environments, where professional autonomy, ethical obligations, and patient-centered care introduce distinct organizational dynamics.By bridging communication theory, branding scholarship, and healthcare management research, this study contributes to a deeper understanding of how private healthcare organizations can cultivate sustainable competitive advantage through internal alignment and cohesive organizational culture. In doing so, it responds to the growing need for management models that acknowledge the human, relational, and identity-based dimensions of healthcare service delivery.

2. LITERATURE REVIEW

2.1. Organizational Communication in Healthcare Settings

Organizational communication constitutes a central pillar of effective management and has been extensively examined within management and organizational theory [13-14]. Classical models conceptualize communication as the transmission of information across hierarchical structures, while contemporary perspectives emphasize its

relational, cultural, and strategic dimensions [14]. In complex service organizations, particularly healthcare institutions, communication is not merely informational but coordinative and constitutive, shaping professional identity, trust, and collective action.Healthcare organizations are characterized by multidisciplinary collaboration, high task interdependence, and time-sensitive decision-making [15]. Research in healthcare management consistently demonstrates that ineffective communication contributes to medical errors, fragmented care, and reduced patient satisfaction [16]. Conversely, structured internal communication systems enhance clarity of roles, reduce ambiguity, and foster collaborative problem-solving. In clinical environments, formal channels (e.g., protocols, reporting systems, administrative briefings) must coexist with informal communication networks that facilitate rapid coordination and knowledge exchange.Contemporary literature also highlights the strategic role of communication in fostering employee engagement [17]. Two-way communication processes, feedback mechanisms, and transparent leadership messaging contribute to increased job satisfaction and organizational commitment [18]. In private healthcare institutions, where performance outcomes and service quality directly influence competitiveness, communication quality becomes a determinant of operational efficiency and staff retention [19]. Thus, organizational communication in healthcare transcends operational coordination and functions as a driver of cultural cohesion and strategic alignment.

2.2. Internal Branding: Conceptual Foundations and Organizational Implications

Branding has traditionally been examined within marketing literature as an external positioning mechanism aimed at differentiating organizations in competitive markets [20]. However, scholars increasingly argue that a brand's credibility depends on its internal enactment [21]. Internal branding refers to the processes through which organizations communicate brand values, mission, and identity to employees, encouraging them to embody and deliver the brand promise in their professional roles [22].The theoretical foundation of internal branding draws on identity theory, organizational culture theory, and strategic management perspectives [23]. A strong internal brand aligns employees' values and behaviors with organizational objectives, thereby reducing inconsistencies between external communication and service delivery [22]. In service-intensive sectors such as healthcare, employees effectively become "brand ambassadors", as patient perceptions of quality are heavily influenced by interpersonal interactions and service experiences.Studies indicate that internal branding positively influences employee motivation, commitment, and behavioral consistency [24]. Training programs, leadership communication, value-based recruitment, and performance management systems serve as key mechanisms through which internal branding is operationalized [25]. When internal branding initiatives are coherent and integrated, they foster shared understanding, reinforce professional accountability, and contribute to service standardization [22].Within private healthcare, where reputation and patient trust are strategic assets, internal branding assumes heightened importance [26]. The literature suggests that healthcare organizations must ensure that their declared values, such as patient-centeredness, safety, innovation, and compassion, are embedded in daily practice [27]. Failure to align internal behaviors with external promises can lead to reputational risk and erosion of stakeholder confidence.

2.3. The Interrelationship Between Communication and Internal Branding

Although organizational communication and internal branding are frequently discussed as separate constructs, emerging scholarship recognizes their interdependence. Internal branding relies heavily on effective communication processes to disseminate values, articulate mission statements, and cultivate shared meaning [22]. Without structured and consistent communication, brand values remain abstract and disconnected from operational realities [28].Communication functions as the primary vehicle through which brand identity is interpreted and internalized by employees [29]. Leadership messaging, storytelling, internal campaigns, and participatory dialogue all contribute to translating strategic brand concepts into actionable behaviors [30]. Furthermore, feedback loops enable management to assess whether brand values are understood and enacted across professional groups.The literature emphasizes that alignment between communication strategy and branding strategy enhances organizational coherence [31]. When internal communication is fragmented or inconsistent, employees may experience ambiguity regarding organizational priorities, leading to service variability [28]. Conversely, organizations that strategically integrate communication planning with branding initiatives report higher levels of engagement, clarity of purpose, and behavioral alignment.

2.4. Strategic Management in Private Healthcare Contexts

Strategic management in private healthcare requires balancing clinical excellence, operational efficiency, financial sustainability, and patient satisfaction [32]. Unlike purely commercial organizations, healthcare institutions operate within ethical frameworks and regulatory constraints that shape managerial decision-making [33]. Therefore, strategic tools must address not only market positioning but also professional norms, interdisciplinary collaboration, and patient safety standards.Recent healthcare management literature underscores the importance of intangible assetsin achieving sustainable competitive advantage [34]. Communication systems and internal branding practices contribute directly to the cultivation of these intangible resources [27]. They strengthen internal integration, facilitate strategic implementation, and support change management initiatives in rapidly evolving healthcare environments.Moreover, the growing emphasis on patient-centered care reinforces the need for internal alignment [35]. Delivering consistent patient experiences requires shared understanding among administrative and clinical staff regarding service standards, ethical principles, and organizational values. Strategic communication and branding integration thus emerge as mechanisms for bridging managerial objectives with frontline clinical practice.

Despite substantial research on communication in healthcare and increasing attention to internal branding in service industries, limited scholarship explicitly examines their combined strategic role within private healthcare organizations. Existing studies often focus on patient communication, marketing strategies, or isolated employee engagement initiatives without situating these elements within a unified managerial framework.Additionally, much of the internal branding literature has been developed in corporate or hospitality contexts, with less emphasis on the distinctive dynamics of clinical environments characterized by professional autonomy, hierarchical medical structures, and ethical accountability. There is therefore a need for integrative models that address how communication systems and internal branding practices can be strategically aligned to enhance cohesion, performance, and patient trust in private healthcare settings.By synthesizing these strands of literature, the present study positions organizational communication and internal branding not as parallel functions but as interdependent strategic tools. This integrated perspective provides the conceptual foundation for examining how private healthcare institutions can leverage internal alignment to achieve operational excellence and sustainable competitive advantage.

3. METHODOLOGY

The present study adopts a quantitative research design in order to investigate the role of organizational communication and internal branding as strategic management tools in private healthcare organizations. A cross-sectional survey methodology was selected as the most appropriate approach for systematically capturing the perceptions of healthcare professionals working in clinical environments. The quantitative orientation of the study enables the empirical examination of relationships among constructs and supports statistical generalization within the examined sample.Data were collected through a structured questionnaire administered to healthcare professionals employed in private healthcare institutions. The final sample consisted of 247 respondents. Participants were selected using a non-probability convenience sampling approach, targeting professionals from various clinical and administrative roles in order to reflect the multidisciplinary structure of private healthcare settings.The demographic profile of the respondents indicates a relatively balanced gender distribution, with 54.3% male and 45.7% female participants. The mean age of the sample was 43.9 years, suggesting a mature group of professionals with substantial work experience in healthcare environments. With regard to educational attainment, 32.3% of respondents held a Master's degree, 18.7% held a PhD, and the remaining participants held a Bachelor's degree. The high level of academic qualifications within the sample reflects the specialized nature of private healthcare services and supports the credibility of the responses provided.

The primary research instrument was a structured questionnaire developed on the basis of established theoretical frameworks in organizational communication, internal branding, and healthcare management. The questionnaire consisted exclusively of closed-ended items measured using a Likert-type scale, allowing respondents to express their level of agreement with statements related to the constructs.The reliability and validity of the instrument were rigorously assessed prior to hypothesis testing. Internal consistency reliability was evaluated using Cronbach's alpha coefficients. The results demonstrated satisfactory levels of reliability, with all constructs exceeding the widely accepted threshold of 0.70, indicating strong internal consistency among the measurement items.Construct validity was examined through Confirmatory Factor Analysis (CFA). The analysis was conducted to verify the proposed measurement model and to confirm that the observed variables appropriately loaded onto their respective latent constructs. The CFA results supported the hypothesized factor structure, and the model fit indices met acceptable criteria, indicating that the measurement model demonstrated satisfactory convergent and discriminant validity.The

collected data were analyzed using appropriate statistical techniques. Descriptive statistics were employed to present the demographic characteristics of the sample and to summarize respondents' perceptions regarding organizational communication and internal branding practices. Inferential statistical analyses were subsequently conducted to examine the relationships among the key constructs and to evaluate their strategic implications within private healthcare management.

4. RESULTS

The correlation analysis reveals strong and positive relationships among all examined variables. Organisational Communication is strongly correlated with Employee Commitment (r = 0.582), indicating that higher levels of structured and effective communication are associated with increased employee commitment within private healthcare organizations.Internal Branding also demonstrates a strong positive correlation with Employee Commitment (r = 0.547), suggesting that when employees internalize organizational values and brand identity, their level of commitment to the organization increases substantially.Furthermore, Organisational Communication and Internal Branding are positively and strongly related (r = 0.524), supporting the theoretical assumption that effective communication mechanisms facilitate the successful implementation of internal branding initiatives. These findings are fully aligned with the conceptual framework of the study, which positions communication and internal branding as interdependent strategic management tools.

Table 1. Relationships between the constructs

Variables	Organisational Communication	Internal Branding	Employee Commitment
Organisational Communication	1.000	0.524	0.582
Internal Branding	0.524	1.000	0.547
Employee Commitment	0.582	0.547	1.000

The multiple regression analysis examined the combined effect of Organisational Communication and Internal Branding on Employee Commitment. The results indicate that both variables significantly and positively predict Employee Commitment.Organisational Communication has a regression coefficient of $\beta = 0.413$, meaning that for every one-unit increase in perceived communication effectiveness, Employee Commitment increases by approximately 0.413 units, holding Internal Branding constant.Internal Branding has a regression coefficient of $\beta = 0.324$, indicating that a one-unit increase in internal branding perception leads to a 0.324 unit increase in Employee Commitment, controlling for communication effects.The findings demonstrate that both predictors contribute meaningfully to explaining variations in employee commitment, with Organisational Communication showing a slightly stronger predictive effect. This supports the study's theoretical proposition that structured communication systems and coherent internal branding practices function as complementary strategic levers within private healthcare management.

Table 2. Multiple Regression Analysis

Predictor	Unstandardized Coefficient (β)	P
Constant	0.784	<.05
Organisational Communication	0.413	<.05
Internal Branding	0.324	<.05

Dependent Variable: Employee Commitment

The results provide empirical support for the central premise of the study that organizational communication and internal branding operate as strategic management tools in private healthcare settings. The strong positive correlations confirm that improved communication structures are associated with stronger brand internalization and higher levels of employee commitment. The regression analysis further demonstrates that both constructs exert independent and substantial predictive effects on employee commitment, reinforcing the argument that managerial investment in communication systems and internal branding initiatives can enhance organizational cohesion, staff alignment, and overall performance.These findings are consistent with contemporary organizational theory, which

emphasizes that in knowledge-intensive and high-stakes environments such as private healthcare, internal alignment mechanisms are critical for sustaining service excellence, professional accountability, and patient trust.

5. DISCUSION

The present study examined organizational communication and internal branding as strategic management tools in private healthcare organizations, focusing on their relationship with employee commitment. The findings indicate strong and positive associations among the examined variables, confirming the theoretical proposition that structured communication systems and coherent internal branding practices contribute significantly to strengthening employee commitment in clinical environments.The strong correlation between organizational communication and employee commitment highlights the strategic role of transparent, consistent, and multidirectional communication in private healthcare settings. Clinical environments are characterized by high interdependence, professional specialization, and time-sensitive decision-making. In such contexts, communication does not merely facilitate information exchange but shapes trust, reduces ambiguity, and fosters psychological attachment to the organization. When healthcare professionals perceive communication processes as clear and supportive, they are more likely to identify with organizational goals and demonstrate higher levels of engagement.Similarly, the positive relationship between internal branding and employee commitment confirms that brand values must be embedded internally in order to be effectively delivered externally. In private healthcare, where service quality is closely tied to interpersonal interactions, employees function as carriers of the brand promise. The findings suggest that when internal branding initiatives successfully communicate shared values, mission clarity, and professional standards, employees exhibit stronger organizational identification and a deeper sense of responsibility toward service excellence.The regression analysis further demonstrates that both organizational communication and internal branding independently predict employee commitment, with communication showing a slightly stronger effect. This finding reinforces the conceptual argument that communication mechanisms constitute the foundation upon which internal branding initiatives are built. Without structured communication systems, brand values risk remaining symbolic statements rather than operational principles guiding everyday clinical practice.Overall, the results support an integrated strategic perspective. Organizational communication and internal branding should not be treated as isolated administrative or marketing functions but as complementary managerial mechanisms that enhance alignment, reinforce professional accountability, and support consistent patient-centered care.

6. MANAGERIAL IMPLICATIONS

The findings of this study carry important managerial implications for private healthcare organizations. First, management should invest in developing structured internal communication systems that promote transparency, feedback, and interdisciplinary dialogue. This includes regular briefings, digital communication platforms, participatory decision-making processes, and leadership visibility. Strengthening communication channels can reduce organizational silos and foster a culture of collaboration, which is essential in clinical environments.Second, internal branding initiatives should be systematically aligned with communication strategies. Brand values, mission statements, and service standards must be continuously communicated and reinforced through training programs, performance evaluation systems, onboarding processes, and leadership behavior. Managers should ensure that the external brand promise communicated to patients is consistently reflected in internal organizational practices.Third, leadership plays a critical role in integrating communication and internal branding. Leaders act as interpreters of organizational values and as role models who embody the brand in daily practice. By demonstrating consistency between strategic messaging and managerial actions, leaders strengthen credibility and reinforce employee commitment.Finally, private healthcare organizations seeking sustainable competitive advantage should view employee commitment as a strategic outcome rather than a secondary organizational benefit. Investing in communication quality and internal brand coherence can enhance staff retention, improve service consistency, and ultimately increase patient trust and organizational reputation.

7. RESEARCH LIMITATIONS

Despite its contributions, the study is subject to several limitations. First, the cross-sectional research design limits the ability to draw causal inferences. Although strong associations were identified, longitudinal research would be necessary to confirm the directionality of relationships among communication, internal branding, and employee commitment.Second, the use of self-reported questionnaire data may introduce common method bias, as all variables were measured using the same instrument. Future research could incorporate multi-source data, such as

managerial assessments or objective performance indicators, to strengthen validity.Third, the sample was limited to 247 healthcare professionals within private healthcare settings, which may restrict the generalizability of the findings to other healthcare systems or public sector organizations. Future studies could compare private and public healthcare institutions to examine whether the strategic role of communication and internal branding differs across organizational contexts.Finally, while the study focused on employee commitment as a key outcome variable, additional performance indicators such as patient satisfaction, service quality metrics, and organizational performance could be incorporated in future research to provide a more comprehensive evaluation of strategic impact.Notwithstanding these limitations, the study contributes to the growing body of literature emphasizing the strategic importance of internal alignment mechanisms in healthcare management. By demonstrating the strong interrelationships among organizational communication, internal branding, and employee commitment, the research underscores the need for integrated managerial frameworks that recognize communication and branding as core strategic functions in private healthcare organizations.

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Beyond the Purchase: How Gen Z Traits and Innovation-Oriented Product Categories Shape Consumer Responses

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Abstract

This study examines the factors that shape post-purchase consumer behavior among Generation Z, emphasizing psychological and attitudinal determinants, generational attributes, and the moderating influence of product type. Building upon established theoretical foundations, the research proposes an integrated framework that connects behavioral intentions and generational characteristics with outcomes occurring after the purchase decision. A quantitative cross-sectional survey was conducted with 302 participants belonging to Generation Z, utilizing validated measurement instruments and robust statistical techniques. The findings reveal that behavioral and attitudinal dimensions significantly and positively influence post-purchase behavior, particularly through technology acceptance, perceptions of online shopping, and intentions to purchase digitally. Distinctive generational traits further explain post-purchase reactions, with online reviews, visual stimuli, and digital word-of-mouth exerting stronger effects than influencer endorsement or environmental consciousness. The moderation analysis demonstrates that product type plays a critical role in shaping these relationships. The impact of both behavioral-attitudinal factors and generational characteristics is most pronounced in low-involvement products, diminishes in high-involvement categories, and is weakest in luxury product contexts. The study advances theoretical understanding by extending established behavioral models into the post-purchase phase and by incorporating generational and cultural dimensions into explanations of loyalty and advocacy. From a managerial perspective, the results underscore the need for differentiated post-purchase strategies aligned with product category and tailored to Generation Z's preference for peer validation and integrated digital experiences.

Keywords: Gen Z, Consumer behavior, Behavioral factors, Attitudinal patterns, Product type, Post purchase

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1. INTRODUCTION

The evolution of consumer behavior research has shifted attention from the moment of purchase to the broader consumption cycle, particularly the post-purchase stage [1]. In contemporary digital markets, post-purchase behavior has become a critical determinant of brand reputation, loyalty development, and long-term organizational performance [2]. Consumers no longer evaluate products privately but instead, they externalize their experiences through online reviews, ratings, social media content, and digital communities [3]. These behaviors amplify individual evaluations into collective market signals. Within this context, Generation Z represents a pivotal cohort. As digital natives, members of this generation navigate seamlessly between physical and digital consumption environments, integrating technology into every stage of the buying process [4]. Their consumption behavior extends beyond acquisition to active participation in digital ecosystems, where advocacy, criticism, and symbolic expression shape brand narratives [5].

Despite extensive research on consumer decision-making, most studies focus predominantly on pre-purchase intentions and purchase determinants, leaving the post-purchase stage comparatively underexplored [6-8]. Furthermore, generational characteristics are often examined descriptively rather than integrated into comprehensive behavioral models [9-10]. In addition, product type is rarely incorporated as a moderating variable in models explaining post-purchase outcomes. The present study addresses these gaps by examining how behavioral and attitudinal factors, together with Generation Z traits, influence post-purchase consumer behavior and how these relationships vary across product categories. By integrating psychological drivers, generational characteristics, and product involvement levels into a unified conceptual framework, the study advances a more context-sensitive understanding of consumer behavior in digitally mediated markets.

2. LITERATURE REVIEW

Behavioral and attitudinal determinants have long been central to consumer behavior theory [11]. The Theory of Planned Behavior proposes that attitudes, subjective norms, and perceived behavioral control shape intentions, which in turn predict behavior [12]. Although traditionally applied to explain purchase intentions, this framework is equally relevant in the post-purchase stage, where attitudes and intentions influence satisfaction, loyalty, and advocacy [4]. Similarly, the Technology Acceptance Model emphasizes perceived usefulness and ease of use as determinants of digital adoption [13]. In online retail environments, technology acceptance extends beyond purchase facilitation and influences how consumers interact with brands after transactions, including their engagement in reviews and digital word-of-mouth [4]. The Theory of Reasoned Action reinforces the importance of attitudinal consistency, suggesting that favorable attitudes toward brands and online shopping environments sustain behavioral continuity beyond the initial purchase [14]. Within this theoretical foundation, several constructs emerge as particularly influential. Brand engagement reflects the cognitive, emotional, and behavioral investment consumers develop toward brands [15]. Technology acceptance captures readiness to interact with digital platforms. Brand behavioral intention expresses the likelihood of repurchase and recommendation [16]. Shopper lifestyle reflects value systems and identity orientations that shape consumption patterns [17]. Attitude toward online shopping and intention to shop online capture digital predispositions, while perceived innovativeness and early adopter mindset relate to openness to novelty and diffusion processes [18]. Together, these variables represent psychological drivers that may extend their influence into post-purchase evaluations and behaviors.

Generation Z introduces an additional layer of complexity. Born into an environment characterized by constant connectivity and digital interactivity, this cohort demonstrates heightened reliance on peer-generated content and visual communication [5]. Online reviews, digital buzz, and aesthetic presentation serve as critical validation mechanisms [4]. Although influencer marketing has been widely discussed in marketing practice, emerging evidence suggests that peer credibility and collective validation may exert stronger long-term effects [19]. Environmental consciousness and price sensitivity are frequently attributed to this generation; however, their influence on post-purchase behavior remains uncertain [20]. The integration of these generational traits into behavioral models is essential for understanding contemporary consumption patterns.

Product type further contextualizes consumer responses. Low-involvement products are typically purchased with minimal cognitive effort and habitual processing, while high-involvement products require extensive evaluation and perceived risk mitigation [21]. Luxury products introduce symbolic and identity-related dimensions that transcend functional utility [22]. Involvement theory suggests that the strength of psychological drivers may vary depending on product category, yet this moderating role has rarely been empirically tested in integrated post-purchase models [23].

Incorporating product type as a moderator acknowledges that consumer responses are not uniform across categories but shaped by situational and symbolic contexts.

3. METHODOLOGY

The study employed a quantitative cross-sectional design to examine the proposed relationships. Data were collected from 302 members of Generation Z aged between 18 and 27 years. The sample size exceeded statistical power requirements, ensuring reliable detection of significant effects. Participants were recruited primarily from university environments, reflecting a digitally active and commercially relevant segment of the cohort. Measurement instruments were developed using established and validated scales drawn from prior consumer behavior and digital marketing research. Constructs such as technology acceptance, brand engagement, behavioral intention, lifestyle orientation, online attitudes, and perceived innovativeness were adapted to the study context. Generation Z traits and post-purchase consumer behavior were measured using theoretically grounded items aligned with previous empirical work (Table 1).

Table 1. Scales selection

Variable	Source
TAM	[24, 25, 26]
Shopper lifestyle scale	[27]
Perceived brand innovativeness	[28]
Brand behavioural intention	[29, 30]
Online brand engagement	[29]
Intention to shop online	[25]
Early adopters mindset	[31]
Attitude towards online shopping	[25]
Gen Z traits	Own development based on relevant literature
After purchase consumer behaviour	[32, 33]

Reliability and validity were assessed through Cronbach's alpha, exploratory and confirmatory factor analyses, and discriminant validity testing using the Fornell–Larcker criterion. Table 2 presents the results of the exploratory factor analysis and reliability testing for each construct, allowing assessment of sampling adequacy, dimensionality, and internal consistency. Bartlett's Test of Sphericity is significant ($p < .001$) for all scales. This indicates that correlations among items are sufficiently large for factor analysis and confirms that the data are appropriate for structure detection across all constructs. Regarding sampling adequacy, the Kaiser–Meyer–Olkin (KMO) values show generally acceptable to excellent levels. The strongest KMO values appear for Attitude toward Online Shopping (.933), Technology Acceptance Model (TAM) (.873), Intention to Shop Online (.869), and Online Brand Engagement (.847). These values exceed the recommended threshold of .70 and indicate that the items within these constructs share substantial common variance, making them well-suited for factor analysis. Gen Z characteristics (.808) and Early Adopters' Mindset (.708) also show satisfactory adequacy. The Shopper Lifestyle scale (.711) is acceptable but closer to the lower boundary, suggesting moderate shared variance among its items. The lowest KMO values appear for Brand Behavioral Intention (.500) and After-Purchase Consumer Behavior (.500). A KMO of .50 is considered the minimum acceptable level, indicating that these two scales may be borderline in terms of sampling adequacy, likely due to the small number of items. The number of extracted factors reflects the dimensionality of each construct. TAM produced five factors, which is theoretically consistent given its multidimensional structure (e.g., perceived usefulness, ease of use, behavioral intention). The Shopper Lifestyle scale extracted seven factors, confirming that lifestyle is a complex, multidimensional construct. Online Brand Engagement produced three factors, also aligning with its cognitive, emotional, and behavioral components. In contrast, Brand Behavioral Intention, Intention to Shop Online, Early Adopters' Mindset, Attitude toward Online Shopping, Gen Z Characteristics, and After-Purchase Consumer Behavior emerged as single-factor solutions, supporting their conceptual unidimensionality. Cronbach's alpha values provide evidence of internal consistency reliability. Excellent reliability (above .90) is observed for Attitude toward Online Shopping (.934), Intention to Shop Online (.919), TAM (.921), and Online Brand Engagement (.905). These values indicate very strong internal coherence among items. Acceptable reliability (above .70) is found for Brand Behavioral Intention (.754), Early Adopters' Mindset (.732), and Gen Z Characteristics (.752), suggesting satisfactory consistency. However, the Shopper Lifestyle scale (.663) and After-Purchase Consumer Behavior (.666) fall slightly below the conventional .70 threshold, indicating moderate reliability. These lower values may be attributed to the multidimensional nature of lifestyle and the limited number of items in the post-purchase construct. The

relatively small number of items in Brand Behavioral Intention and After-Purchase Consumer Behavior likely affects reliability estimates, as Cronbach's alpha is sensitive to scale length. Overall, the table indicates that most constructs demonstrate satisfactory psychometric properties, with strong sampling adequacy and high reliability for the majority of scales. However, the Shopper Lifestyle and After-Purchase Consumer Behavior constructs may benefit from refinement or expansion in future research to improve internal consistency and measurement robustness.

Table 2. Scale validity and reliability analysis

Scale	Factors extracted	KMO	Bartlett's Test of Sphericity	Cronbach's Alpha	Items
TAM	5	.873	<.001	.921	21
Shopper lifestyle scale	7	.711	<.001	.663	23
Brand behavioural intention	1	.500	<.001	.754	2
Online brand engagement	3	.847	<.001	.905	9
Intention to shop online	1	.869	<.001	.919	7
Early adopters mindset	1	.708	<.001	.732	6
Attitude towards online shopping	1	.933	<.001	.934	7
Gen Z characteristics	1	.808	<.001	.752	7
After purchase consumer behaviour	1	.500	<.001	.666	2

Model fit indices indicated satisfactory psychometric robustness, and common method bias testing suggested no significant distortion in the data (Table 3). The Fornell-Larcker matrix is used to assess discriminant validity by comparing the square root of each construct's Average Variance Extracted (AVE) with its correlations with other constructs. Discriminant validity is established when the diagonal value (√AVE) for each construct is greater than all correlations in its corresponding row and column. This indicates that the construct shares more variance with its own indicators than with other constructs. In Table 3, all diagonal values exceed the off-diagonal correlations, confirming satisfactory discriminant validity across the model. For example, Technology Acceptance (TAM) has a square root of AVE equal to .76, which is higher than its correlations with other constructs, ranging from .36 to .49. Although TAM shows relatively strong correlations with Intention to Shop Online (.49) and Attitude Toward Online Shopping (.47), these correlations remain below .76, demonstrating that TAM is empirically distinct from these theoretically related constructs. Similarly, Intention to Shop Online (ISO) has a √AVE of .77, which exceeds its highest correlation (.49 with Attitude Toward Online Shopping). This is theoretically expected, as these two constructs are conceptually related within digital consumption frameworks, yet they remain statistically distinct. Attitude Toward Online Shopping (ATOS) also shows adequate discriminant validity, with a √AVE of .77, higher than its strongest correlation (.49 with ISO and .46 with OBE). Online Brand Engagement (OBE) and Brand Behavioral Intention (BBI) both show diagonal values of .75, exceeding their correlations with other constructs, even though moderate associations are observed with ISO and ATOS. These moderate inter-construct correlations indicate conceptual relatedness without redundancy. Shopper Lifestyle (SL), Early Adopters' Mindset (EAM), Perceived Brand Innovativeness (PBI), and Gen Z Traits all demonstrate diagonal values (.72, .73, .74, and .73 respectively) that are clearly higher than their inter-construct correlations, which generally remain below .45. This confirms that these constructs capture distinct behavioral or generational dimensions. After-Purchase Behavior (APB) has a √AVE of .71, which exceeds its correlations with all other constructs (maximum .44 with ISO and .43 with OBE). This indicates that the dependent variable is empirically separable from its predictors, reducing concerns about conceptual overlap or multicollinearity. Overall, the matrix confirms that all constructs satisfy the Fornell–Larcker criterion. While several constructs show moderate correlations, particularly among digital-oriented variables such as TAM, ISO, ATOS, and OBE, these relationships are theoretically justified and do not threaten discriminant validity. Therefore, the measurement model demonstrates adequate construct distinctiveness, supporting its suitability for subsequent structural modeling and hypothesis testing.

Table 3. Fornell-Larcker Discriminant Validity Matrix

Construct	TAM	SL	BBI	OBE	ISO	EAM	ATOS	PBI	Gen Z traits	APB
Technology acceptance (TAM)	.76	.42	.38	.44	.49	.36	.47	.41	.40	.39
Shopper Lifestyle (SL)		.72	.40	.43	.38	.34	.36	.39	.37	.35

Brand behavioral intention (BBI)	.75	.41	.46	.33	.44	.42	.36	.40
Online brand engagement (OBE)		.75	.48	.38	.46	.45	.41	.43
Intention to shop online (ISO)			.77	.37	.49	.46	.42	.44
Early adopters' mindset (EAM)				.73	.35	.37	.34	.33
Attitude toward online shopping (ATOS)					.77	.45	.43	.41
Perceived brand innovativeness (PBI)						.74	.42	.38
Gen Z traits							.73	.40
After-purchase behavior (APB)								.71

*(Diagonal values = √AVE; Off-diagonal = inter-construct correlations)

4. RESULTS

The findings reveal that behavioral and attitudinal factors exert a strong positive influence on post-purchase consumer behavior (Table 4). Intention to shop online, technology acceptance, and attitude toward online shopping emerged as the most powerful predictors, indicating that digital readiness and motivational orientation play a central role in sustaining satisfaction and advocacy after purchase. Brand behavioral intention and lifestyle orientation demonstrated moderate positive effects, while early adopter mindset did not significantly predict post-purchase outcomes. These results suggest that innovation perception alone does not guarantee enduring engagement unless accompanied by positive digital experiences.

Table 4. Correlations between Behavioral & attitudinal factors and Post-purchase consumer behavior

		Post-purchase consumer behavior
Spearman's rho	Perceived brand innovativeness	.174**
	Early adopters mindset	.098
	Online Brand engagement	.198**
	Technology acceptance	.395**
	Intention to shop online	.422**
	Attitude toward online shopping	.379**
	Total shopper lifestyle scale	.242**
	Brand behavioural intention	.310**
	Overall Behavioural and attitudinal factors	.448**

**. Correlation is significant at the 0.01 level (2-tailed).

Generation Z characteristics also positively influenced post-purchase consumer behavior, though with smaller effect sizes compared to behavioral and attitudinal factors (Table 5). Online reviews, visual elements, and online buzz emerged as the strongest generational predictors. In contrast, influencer impact, environmental responsibility, and product price exhibited weak or non-significant relationships. These findings indicate that peer-generated validation and visual engagement outweigh traditional influencer authority in shaping sustained consumer responses.

Table 5. Correlations between Gen Z traits and Post-purchase consumer behavior

	Post-purchase consumer behavior
Online reviews impact	.319**
Influencers impact	-.023
Online buzz impact	.272**
Visual elements impact	.315**
Environmental responsibility impact	.085
Product price impact	.103
Brand community impact	.149**
Gen Z characteristics	.295**

**. Correlation is significant at the 0.01 level (2-tailed).

Moderation analysis confirmed the critical role of product type (Table 6). The effect of behavioral and attitudinal factors on post-purchase behavior was strongest for low-involvement products, moderate for high-involvement products, and weakest for luxury products. A similar pattern was observed for Generation Z characteristics. This suggests that routine purchases amplify the impact of psychological and generational drivers, whereas symbolic and prestige-related dimensions in luxury contexts reduce their explanatory power.

Table 6. Regression Coefficients "Behavioral and attitudinal factors / Post-purchase consumer behavior – Product type

Predictor variables	β	SE	t	p	LLCI	ULCI
Constant	-2.3836	.9871	-2.4148	.0163	-4.3262	-.4411
Behavioural and attitudinal factors (BAF)	1.4817	.2322	6.3823	.0000	1.0248	1.9386
Product type	1.4504	.5031	2.8830	.0042	.4603	2.4404
Interaction (BRF x Product type)	-.3723	.1162	-3.2045	.0015	-.6009	-.1436

5. DISCUSION

The results extend established behavioral theories into the post-purchase domain, demonstrating that attitudes and intentions continue to shape consumer outcomes beyond the transaction itself. The Technology Acceptance Model proves particularly relevant in explaining how digital readiness supports ongoing engagement and advocacy. The Theory of Planned Behavior and the Theory of Reasoned Action maintain predictive validity in digitally mediated post-purchase environments. The findings also refine our understanding of Generation Z. While this cohort is frequently associated with influencer culture and sustainability concerns, the empirical evidence suggests that peer reviews, digital buzz, and visual aesthetics are more decisive in shaping after-purchase engagement. This highlights a shift toward horizontal credibility structures rooted in collective digital participation. The moderating effect of product type provides an important theoretical refinement. In low-involvement contexts, cognitive attitudes and digital habits translate directly into predictable post-purchase behaviors. In high-involvement purchases, additional reassurance and performance evaluation processes intervene. In luxury markets, identity signaling and symbolic meaning overshadow psychological predictors. This underscores the necessity of integrating contextual moderators into consumer behavior models. From a managerial perspective, firms should tailor post-purchase strategies according to both generational characteristics and product category. For low-involvement products, reinforcing digital convenience and positive attitudes is critical. For high-involvement products, reassurance, customer support, and trust-building mechanisms are essential. In luxury markets, symbolic reinforcement and exclusivity-driven experiences sustain engagement more effectively than functional communication.

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Teaching, Learning and E-learning (IAC-TLEl)

"It's Motivating, but Complex": Pre-Service Teachers' Views on Using Mobile Applications in Teaching and Learning Outside the Classroom

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Abstract

Teaching and learning outside the classroom provide rich opportunities for authentic, experiential learning, yet little is known about how pre-service primary teachers are being prepared to incorporate mobile applications into such contexts. This study examines their readiness, experiences, and perceptions of mobile learning in outdoor and out-of-classroom settings. A focus group with seven pre-service primary teachers was conducted, and the data were analysed using qualitative content analysis. The findings reveal a clear recognition of the pedagogical value of mobile applications—particularly for increasing learner motivation, supporting active engagement, enabling personalised learning paths, and facilitating immediate feedback and formative assessment. However, participants report limited exposure to mobile applications during their studies and consequently perceive themselves as insufficiently competent to implement mobile-supported outdoor learning. They also identify significant challenges, including time constraints, technological and connectivity issues, safety concerns, and the risk of off-task behaviour. The results highlight a significant gap between the recognised potential of mobile learning and the level of preparation provided in teacher education programmes. The study highlights the importance of integrating mobile learning systematically into university courses, modelling good practice by teacher educators, and providing opportunities for authentic, experiential learning to support the professional development of future primary teachers.

Keywords: mobile learning, pre-service primary teachers, teaching and learning outside the classroom, digital competence

1. INTRODUCTION

The role of the teacher in the educational process is extensive and complex, as it encompasses and integrates all key dimensions of education. Any change within the educational process directly affects the teacher's role, meaning that new theoretical and empirical insights often lead to profound paradigm shifts in how this role is understood and enacted. In traditional conceptions of teaching, instruction was frequently depicted as a one-directional didactic communication: teacher – subject matter – students. In contemporary education, however, the relationships among the subjects and other constitutive components of the educational process are changing [21]. In line with modern

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teaching approaches grounded in constructivist theories of teaching and learning—which emphasise the active role of students in the learning process—it is essential to provide adequate preparation for future teachers at all levels of their education. Teacher educators and practicing teachers play a crucial role in this regard.

Štemberger, Čotar Konrad, and Rutar [33] identify teacher educators as one of the most crucial factors in efforts to enhance the quality of teacher education, particularly during initial teacher preparation. According to Marentič Požarnik [23] those who educate teachers must master both the theory and practice of contemporary education and embody high-quality teaching themselves. Within this framework, the development of competencies for teaching in authentic learning environments outside the classroom is emerging as a crucial dimension of modern teacher preparation. Effective implementation of teaching and learning outside the classroom requires improving teacher training both in initial education and through continuous professional development. Teachers must be equipped to connect outdoor learning with curriculum objectives and to overcome barriers such as safety concerns and limited resources [36].

In this paper, we present the education and training of pre-service primary teachers for teaching and learning outside the classroom, followed by the results of a qualitative study conducted with primary education students. The chapter concludes with final reflections and recommendations for more effective and more frequent use of mobile technology in teaching and learning outside the classroom at the primary level.

1.1. Teaching and learning outside the classroom

Teaching and learning outside the classroom refers to organised educational activities conducted beyond the school building, grounded in the philosophy, theory, and practice of experiential learning and environmental education [27]. It can take place in a variety of locations, such as the school's surroundings, towns and cities, farms, parks, institutions specialising in outdoor learning (e.g., CŠOD centres, forest schools), cultural and natural heritage sites, museums, theatres, galleries, and similar environments [27]. Teaching outside the classroom can be implemented across different school subjects as part of addressing a wide range of curricular topics. For example, in mathematics, a mathematical walk around the school neighbourhood can be organised, during which pupils solve various mathematical tasks; in environmental studies, pupils may participate in an excursion; and in social studies, they may follow an educational trail through which they acquire curricular content. As Štemberger [32] notes, teaching outside the classroom also offers numerous opportunities for interdisciplinary integration.

Teaching outside the classroom provides pupils with opportunities to acquire concrete, real-life, and authentic learning experiences, stimulating their curiosity and engaging them in meaningful encounters with situations [31]. According to Skribe Dimec [27], it enhances pupils' motivation for learning, fosters their Interest in the subject matter, and positively influences their academic achievement. In addition, outdoor learning can promote cooperation among pupils and positively affect their behaviour in the classroom. Certain forms of outdoor activities can also contribute to improving pupils' physical and mental health, developing fine motor skills, enhancing coordination, and strengthening balance. Despite these advantages, implementing teaching outside the classroom is not always straightforward, as numerous challenges may accompany it. As Štemberger [32] points out, these challenges are most often related to supervising children, scheduling difficulties, material constraints, weather dependency, and time limitations connected to the extensive amount of content prescribed in the curriculum.

1.2. Introducing Pre-Service Primary Teachers to Teaching and Learning Outside the Classroom

Pre-service primary teachers are introduced to teaching outside the classroom during their studies. A review of the curriculum and available course syllabi for the Primary Education programme at the Faculty of Education, University of Maribor, reveals that the range of courses systematically preparing students for teaching and learning outside the classroom is relatively limited. Topics related to out-of-classroom learning are most frequently found in the syllabi of courses connected to the didactics of social studies, geography, history, as well as in some practically oriented elective courses.

Several compulsory courses include objectives that directly relate to the development of competences for teaching outside the classroom. For instance, the syllabi of *Selected Topics in Social Sciences – Geography* and *Selected Topics in Social Sciences – History* contain objectives that focus on training students to conduct fieldwork, with an emphasis on planning and implementing various phases of field research in the local environment. These objectives clearly highlight the importance of field investigation as a didactic approach in social studies education. Elective courses also play a crucial role in developing an understanding of teaching beyond the classroom. One such example is the elective course *Activities Outside the Classroom in Environmental and Social Studies Education*, which specifically addresses

this topic. Within this course, students learn about the fundamental characteristics of out-of-classroom teaching, possibilities for its implementation in line with curriculum objectives, various forms of organising outdoor learning activities, and approaches to planning, conducting, and evaluating such lessons. The course also emphasises fostering pupils' skills and abilities in natural and social environments.

Fieldwork, excursions, and educational walks appear as teaching approaches in several other courses, including: *Social Studies Pedagogical Practicum*, *Didactics of Environmental and Social Studies I*, the elective *Learning and Teaching Cultural Heritage in Environmental and Social Studies*, the elective *Astronomy*, the elective *Skiing and School in Nature*, and the elective *Art Education*.

It is reasonable that the pedagogical approaches taught during the study programme are also enacted in the implementation of higher education teaching itself. Pre-service teachers should participate in authentic out-of-classroom learning experiences during their studies, as such engagement enables them to experience and reflect on this form of teaching firsthand [8]. Korošec, Ambrožič Dolinšek, and Hus [20], as well as Črešnar [9], similarly argue that students should have as many opportunities as possible for experiential learning during their studies. Through this, they acquire in-depth knowledge across subject areas, and gain experience with various experiential learning methods, which in turn increases the likelihood that they will use such approaches in their later teaching practice. Moreover, familiarity with experiential outdoor learning contributes to a more diverse repertoire of teaching activities. Several studies have confirmed that students in programs where teacher educators adopt constructivist teaching approaches and employ student-centered strategies tend to adopt these practices in their own teaching and move away from traditional beliefs about teaching [10, 24].

In a study by Ograjšek and Ivanuš Grmek [26], didactic strategies in higher education are examined from the students' perspective, with a focus on student-centered approaches. The authors note a shift in recent years from traditional, teacher-directed strategies towards approaches that place greater emphasis on students' active role. Students strongly support pedagogical approaches that involve them in decisions regarding various aspects of their education, particularly in the choice of assessment forms, teaching methods, and course content. They expect teacher educators to adopt the role of facilitators who not only provide information but also create supportive learning environments that foster students' learning and skill development. Nevertheless, the authors emphasise that implementing such strategies continues to pose challenges, as existing pedagogical practices need to be adapted and teacher educators must be continually encouraged to engage in professional development in order to implement these strategies effectively.

1.3. Use of Digital Technologies in Teaching and Learning Outside the Classroom

Teaching and learning outside the classroom can be planned, supported, or implemented with the help of digital technologies. In this context, the use of mobile devices is significant and practical, as they can be easily used almost anywhere and at any time. With selected mobile applications, users can quickly search for information online, create or edit photographs, videos, or audio recordings, follow a predesigned route, complete quizzes, and engage in many other learning activities.

The concept of using mobile technologies to facilitate learning is widely recognised in the literature as mobile learning, or m-learning [17]. According to Traxler [34], mobile learning can be understood as an extension of e-learning—learning supported by various electronic devices such as computers or smartphones—since m-learning essentially represents an initiative within e-learning that is delivered through mobile devices. Sulisworo and Toifur [30] describe m-learning as a more recent approach to teaching, one that brings significant changes in terms of accessibility, learning experiences, and personalisation for individual learners.

The meaningful integration of mobile learning into the instructional process can provide teachers and students with numerous advantages for teaching and learning. As noted by Gumbheer et al. [15], m-learning supports the personalisation of learning pathways, enabling students to learn at their own pace and according to their individual preferences. Another key advantage of mobile learning, offered by many applications designed for educational purposes, is the provision of immediate feedback to students [19]. Research further shows that m-learning has a positive impact on student engagement and motivation [2] and contributes to improved educational outcomes [6, 11, 12].

2. RESEARCH

2.1. Research purpose

The purpose of this research was to explore how pre-service primary teachers are being prepared for teaching and learning outside the classroom, utilizing digital technologies, from university training to practical implementation. The emphasis was placed on eliciting personal experiences, reflections, and observations related to the planning, implementation, and evaluation of teaching outside the classroom, supported by mobile applications.

2.2. Research sample

The focus group included seven pre-service primary teachers. No prior preparation was required for participants, as the questions focused on their personal reflections and lived experiences.

2.3. Instrument

The focus group for pre-service primary teachers was designed as a qualitative research instrument to examine in-depth the attitudes, experiences, and practices of future primary teachers regarding their preparation for teaching and learning outside the classroom, supported by digital technologies.
The questions were designed to address the key areas of the research focus: prior experiences, perceived advantages and disadvantages of using mobile applications, reasons for (non-)use, self-assessed digital competence, and intentions for future use. The participants were encouraged to engage in deeper reflection and mutual dialogue, which enabled the collection of rich, contextualised data.

The sequence of questions was as follows:

1. Simple descriptive experiences
2. Reflections on advantages and disadvantages
3. Explanations of reasons and barriers
4. Self-assessment of competences
5. Intentions and future practices

This structure allowed for a natural and coherent flow of discussion, as well as sufficient space for spontaneous interaction and mutual elaboration among the participants.

2.4. Data collection and processing procedures

The participants were informed that data collection would be carried out anonymously. The focus group sessions were recorded for transcription purposes only. After the transcription was completed, all recordings were permanently deleted. We clearly stated that participation was voluntary and that individuals could withdraw from the study at any time. Prior to conducting the focus group, informed consent was obtained from all participants. The focus group was conducted online via MS Teams, which ensured easy access for all attendees.

Content validity was ensured by having two experts in the field review and assess the appropriateness of the interview questions. Reliability was strengthened by carefully constructing clear and unambiguous questions, as well as providing precise instructions to guide the discussion. Objectivity was maintained through the use of neutrally formulated questions, which minimised the risk of suggestive influence. Additionally, participants did not receive any evaluative feedback from the moderator regarding the adequacy of their responses.

For the qualitative part of the study, the data were analysed using qualitative content analysis [13, 14]. Coding units were identified, coded, and merged into broader categories, which were then analysed to identify major themes and specific patterns in the participants' responses [22].

3. RESULTS

In the following section, we present the results of the qualitative content analysis used to analyse the data collected through the focus group, which included seven pre-service primary teachers. The presentation of the findings follows a structure that moves from the general to the specific.

Each theme is presented in a separate table, outlining its content structure, categories, and codes. For each code, the number of participants in whom the code appeared is indicated. The themes are further enriched with authentic quotations from the focus group participants.

3.1. Prior Experiences

Table 1. Prior experiences

Theme	Category	Code
Prior experiences	Mobile applications used	Adventure lab (4), Actionbound (6), Padlet (1), Interactive textbooks (1), Quizizz (1), interactive tablets (2)
	Lack of experience	No use (2)
	Context of use	Museum (3), Classroom practicum (3)

As shown in Table 1, the focus group participants reported a wide range of prior experiences with using mobile applications in teaching and learning outside the classroom. Most encountered such tools only during their studies, particularly in social studies didactics and in the elective course on outdoor learning. They frequently mentioned using the applications *Adventure Lab* and *Actionbound*, especially in the context of museum visits. As one participant explained, *"The one that stuck with me the most was Adventure Lab, which we actually carried out outdoors."*

Some pre-service teachers had no experience with mobile applications prior to their studies or during school placements, as acknowledged by a participant who stated, *"Honestly, I hadn't used them anywhere."* The experiences they do have are typically linked to specific examples of good practice and the support of their mentors. This is illustrated by another participant's observation: *"In the museum we used the Actionbound mobile application during our visit."*

3.2. Advantages and Limitations of Using Mobile Applications in Teaching and Learning Outside the Classroom

Table 2. Advantages and Limitations

Theme	Category	Code
Advantages and Limitations	Pupil motivation and engagement	Increased motivation (6), More engaging instruction (6)
	Learning effectiveness and formative assessment	Faster access to information (4), Immediate feedback (2)
	Interactivity and creativity	Photography and video recording (2), Interactive learning in museums/field settings (2)
	Pedagogical adaptation and digital literacy	Differentiation (2), Digital literacy (3), Replacing worksheets (2)
	Technical and infrastructural limitations	Poor school equipment (3), Weak internet connection (3)
	Time and organisational workload	Too little preparation time (4), High complexity of implementation (3)
	Inappropriate or risky use	Pupils drift into games or YouTube (2), Excessive screen time (2), Device damage (1)
	Competence and privacy concerns	Lack of teacher competence (3), Low interest (4), Privacy and login issues (1)

Results in Table 2 show that the participants identified increased pupil motivation as the central advantage of using mobile applications, noting that digital tools are appealing to pupils and enhance their engagement. One student summarised this by stating, *"For pupils, this is a much more interesting way of learning."* Mobile applications enable quicker access to information, immediate feedback, and more effective formative assessment. They also support differentiation, individualisation, and the integration of diverse media formats that are not easily achievable in traditional classroom instruction. As one participant noted, *"They receive feedback more quickly."* Another emphasised the added value of interactivity and authenticity: *"Taking photos and recording videos allows pupils to do things they cannot do in traditional lessons."*

The participants also highlighted several key challenges that hinder the use of mobile applications in out-of-classroom teaching. The most frequently mentioned obstacles relate to technical limitations, such as insufficient equipment or poor internet connection, as illustrated by the statement, *"In rural areas the signal can be a problem."* Another major barrier is the time-consuming nature of preparing digital activities, as one participant succinctly captured: *"The downside is that there is too little time."* In addition, the students pointed out the risk of pupils accessing inappropriate content, reflected in the observation, *"Pupils can easily slip into games or YouTube."* Concerns about data protection and device safety—particularly among lower-grade students—were also raised.

3.3. Reasons for the Infrequent Use of Mobile Applications in Teaching and Learning Outside the Classroom

Table 3. Reasons for the Infrequent Use

Theme	Category	Code
Reasons for the Infrequent Use	Teacher competence	Lack of competence (4), differences between younger and older teachers (3), misconceptions about digitalisation (1)
	Teacher interest	Lack of Interest (4)
	School leadership support	Support from leadership (2), poor equipment (2)
	Time constraints	Too little time for preparation (3), curriculum demands

Table 3 shows that the reasons why teachers use mobile applications less frequently are primarily related to their level of competence, their personal Interest, and the institutional conditions in which they work. As one participant emphasised, *"It depends very much on the interest of the teachers."* Teachers often continue to rely on traditional methods because they feel more secure using them and experience less pressure, as preparing digital activities is time-consuming. One pre-service teacher explained this clearly: *"It takes you the whole afternoon, and teachers prefer not to do that."* School leadership also plays a crucial role: institutions that invest in equipment and training are more likely to adopt digital approaches. This was reflected in the comment, *"At our school, the principal strongly encouraged the use of digital technology."*

3.4. Self-Assessment of Pre-Service Teachers' Competence for Teaching Outside the Classroom Using Mobile Applications

Table 4. Self-assesed competence

Theme	Category	Code
Self-assessed competence	Insufficient competence	Insufficiently competent (6)
	Study and practicum experience	Limited coverage of applications at the faculty (3); Learning through school practicum (2); Research experience (1)
	Support	Need for support from colleagues/school leadership (2); Willingness to pursue further training (5)

Most participants assessed their current competence for using mobile applications in out-of-classroom teaching as insufficient, as seen in Table 4. They attributed this primarily to the fact that the topic was addressed too late and

insufficiently during their university studies. One participant explained, *"Unfortunately, I didn't learn enough about this at the faculty."* Despite this, they remain motivated to continue developing their skills and recognise the need for additional training, as reflected in the statement, *"I don't know enough, but I'm willing to learn."* Some competences were gained during school practicum, where they had the opportunity to observe their mentors, illustrated by the comment, *"I learned the most during my practicum."*

3.5. Intentions for Use in Future Teaching Practice

Table 5. Intentions for use in the future

Theme	Category	Code
Intentions for future use	Conditional willingness	Would use if trained (4)
	Conditions and support	Need for support from leadership/colleagues (2)
	Positive attitudes	Recognising the benefits of mobile applications (3); Selective use depending on appropriateness (1)

Results in Table 5 indicate that participants generally expressed a willingness to use mobile applications in their future teaching practice, provided they feel adequately trained and supported by their professional environment. As one student noted, *"If I were trained, I would definitely use them."* They emphasised that technology should be used purposefully and aligned with learning objectives, rather than included merely for the sake of modernity. Some participants also stressed that they would use mobile applications only if they felt supported by colleagues and school leadership, as reflected in the statement, *"If I had support from the leadership, I would."* Overall, the pre-service teachers acknowledged that contemporary society requires the integration of digital tools in education, summarised by the remark: *"We live in a world where digital technology is important."*

4. DISCUSSION

The main finding of the study indicates that the use of mobile applications in teaching and learning outside the classroom depends on the dynamic interplay of individual, institutional, and contextual factors that together form a relational model. As future teachers, the participants recognise the high potential of mobile applications; however, their actual use is shaped by several interrelated factors.

One of the most important findings shows that pre-service primary teachers have limited experience with mobile applications in out-of-classroom teaching acquired during their studies. Consequently, they believe that they are neither sufficiently trained nor competent to use these applications in their teaching, which is consistent with the claims of several researchers [35].

Research suggests that the academic performance of pre-service teachers who have been exposed to mobile technologies during instruction is higher than that of students who have not used such technologies [7, 11, 16]. Considering this, we argue that pre-service teachers—as learners within the study process—have untapped opportunities to enhance their own knowledge. In addition, insufficient exposure means that they are not equipped with the knowledge needed to impact the learning outcomes of their future pupils positively. Studies show that the use of mobile applications contributes to improved educational outcomes among children [6, 12].

This implies the need for greater integration of digital technologies, including the use of mobile applications, in teacher education programmes. Srisawasdi and colleagues [28] emphasise that teaching student teachers how to integrate technology into pedagogical practice is highly demanding, mainly due to the rapid and continuous evolution of digital technologies and the broad range of knowledge that students must master and connect.

According to Baran [4], the inclusion of mobile learning in teacher education typically appears in two ways, each with a different aim: (1) teaching pre-service teachers *about* mobile learning so that they can later incorporate it into their own teaching, and (2) teaching *with* mobile technologies, i.e., using mobile technology to enhance students' own learning. In line with this, Bai [3] suggests that teacher educators should integrate mobile learning by modelling the use of mobile technologies themselves, while also presenting to students the pedagogical value, benefits, and usefulness of mobile learning in teaching. Within this, it is essential to familiarise future teachers with both the advantages and the limitations of using mobile devices for teaching and learning [28].

Our participants clearly recognised the main advantages and challenges of using mobile learning in teaching outside the classroom. They highlighted opportunities to increase pupils' motivation, which may stem from the engaging nature of mobile applications, the use of games, and interactivity—a finding supported by existing research [2, 3]. They also noted the potential for immediate feedback to pupils and the possibility to track their learning progress, which enables formative assessment, as also noted by [19]. While the participants identified several advantages of mobile learning outside the classroom, they also offered a critical perspective. The challenges they recognised relate primarily to the lack of time, poor accessibility of applications (poor signal or internet connection, limited access to platforms, language barriers, login difficulties), and the possibility that pupils may engage in unrelated or undesirable activities. These issues are also noted in other studies [3, 25]. Another significant challenge expressed by the participants relates to concerns about inappropriate use of personal data and online safety risks [3, 25].

Baran [4] further argues that preparing future teachers for the effective use of mobile technology in teaching should be integrated throughout the entire teacher education programme, rather than limited to courses directly related to technology. Participants in our study emphasise that mobile applications are not sufficiently included in the curriculum across different courses, which represents an unexplored opportunity for improving the study process. Moreover, Srisawasdi and colleagues [28] note that teacher educators should introduce multiple mobile applications that can support the achievement of curriculum objectives and the acquisition of learning content. Although participants in our study believe that they lack sufficient knowledge and competencies regarding the use of mobile learning in teaching, it is interesting that they are familiar with a range of mobile applications that could be used for pedagogical purposes. We assume that students become familiar with these applications mainly through leisure activities and perhaps only superficially, meaning that their understanding is not comprehensive or sufficiently in-depth, which is essential for appropriate classroom use.

Despite perceiving their knowledge and competencies related to mobile learning as insufficient for teaching pupils, the participants expressed the importance of integrating mobile learning into instruction. They emphasised that with adequate knowledge and professional support from colleagues, they would be willing to use mobile applications in their teaching. The task of teacher educators, therefore, is to provide them with the appropriate knowledge and support to do so effectively.

5. LIMITATIONS

The limitations of this study relate primarily to the sample characteristics and the nature of qualitative data collection. The findings cannot be generalised to the entire population of pre-service primary teachers at the Faculty of Education, University of Maribor, as the focus group was based on voluntary participation rather than random sampling. It is therefore likely that the participants were individuals who were more interested in the topic and more motivated to share their experiences, which may have influenced the depth and direction of the discussion.

Furthermore, the data reflect the subjective perceptions, beliefs, and self-reported experiences of the participants. These accounts provide valuable insights into how pre-service teachers understand and experience the use of mobile applications in teaching and learning outside the classroom; however, they do not necessarily represent objectively verifiable practices or the views of all students in the program. As with all qualitative research, the findings are context-dependent and should be interpreted with caution when considering broader generalisations.

6. CONCLUSION

To improve the quality of education in higher education institutions, the use of student-centred didactic strategies is essential, as they allow the educational process to be better adapted to the specific needs and expectations of contemporary students, as noted by Ograjšek and Ivanuš Grmek [26]. This finding is consistent with those of other studies [1, 5, 29], which demonstrate that student-centred learning, designed in accordance with the principles of constructivism, more effectively transforms students' traditional beliefs about teaching and encourages them to adopt more modern, learner-oriented teaching approaches in their later professional practice.

To enhance the competence of pre-service primary teachers, it would be advisable to include targeted study courses within the programme that focus on the high-quality implementation of teaching and learning outside the classroom. Through such workshops, students would acquire additional competencies for planning, implementing, and evaluating the learning process in authentic environments. Given the rapid development of digital technologies, we also propose establishing digital support in the form of an interactive handbook and an online platform containing curated resources for teaching and learning outside the classroom at the primary level, not limited solely to social studies.

Projects in which students exchange ideas and examples of good practice related to outdoor and out-of-classroom teaching would also play an important role. Such collaborative activities would further empower students for independent pedagogical work and strengthen the development of their professional identity.

Since Jančič Hegediš [18] found that teacher interest has a significant impact on the frequency of teaching outside the classroom in early social studies, we suggest that pre-service teachers be introduced to these practices during their regular practical training. This would allow students to gain direct experience while simultaneously fostering greater interest in innovative forms of teaching outside the classroom.

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The Relationship Between Internal Locus of Control, Motivation, and Technology: A Two-Phase Pilot Study

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Abstract

This paper reports on the methodological validation of a research instrument investigating the relationship between Academic Locus of Control (LoC), language learning motivation, and technology use among EFL learners. While the link between internal LoC and achievement is well-documented, the mediating role of emerging technologies; specifically the distinction between traditional ICTs and AI; remains underexplored. A two-phase pilot study was conducted with university-level EFL learners in Hungary. Phase 1 (N = 21) revealed high reliability for standardized motivation (α = .969) and LoC (α = .885) scales but identified weaknesses in the researcher-developed ICT scale (α = .550). Following revision, Phase 2 (N = 27) demonstrated significantly improved consistency for the ICT (α = .807) and AI (α = .824) scales. Regarding the LoC-motivation relationship, analyses yielded mixed results: a significant correlation in Phase 1 (r = .51, p = .018) but non-significant in Phase 2 (r = .33, p = .089). Consequently, testing technology's mediating role was postponed to the main study. These findings confirm the refined instrument's reliability, paving the way for a large-scale doctoral study.

Keywords: Academic Locus of Control, Language Learning Motivation, Instrument Validation, ICT, Artificial Intelligence.

1. Introduction

In the field of English as a Foreign Language (EFL), scholars have consistently observed that success depends on more than just mental ability or cognitive aptitude. While intelligence provides a foundation for learning, personality traits often dictate whether a learner will persist when faced with difficulties or engage deeply with the material [1, 2]. One of the most significant psychological factors in this area is Locus of Control (LoC). Rotter [3] introduced this concept to describe a person's general belief about the cause of events in their life. It specifically distinguishes between individuals who believe that outcomes depend on their own behavior, known as internal LoC, and those who believe that outcomes are determined by outside forces such as luck, fate, or other people, known as external LoC [3].

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In educational settings, this belief system is closely linked to how students approach their work. Research shows that students with an internal orientation tend to achieve higher grades, work harder, and use more effective study strategies compared to their externally oriented peers [1, 4, 5]. Rotter [3] clarified that this is not a simple choice between two opposites but rather a continuum where individuals fall somewhere along the scale. Those with strong internal beliefs typically take responsibility for their results, feeling pride in success and focusing on long-term objectives [5]. In contrast, those with external beliefs may experience learned helplessness and attribute their results to chance or the difficulty of the task [4, 6].

This psychological construct is particularly important in the context of foreign language learning because it shapes how students interpret their failures and successes [7]. For example, if a learner believes they performed poorly because the teacher was unfair or the language is too hard (an external attribution) they are less likely to feel a sense of personal agency or control [8]. This connection between a sense of control and academic success can be explained through Self-Determination Theory (SDT). According to Deci and Ryan [9], intrinsic motivation depends on satisfying basic human needs, including the need for autonomy. An internal LoC supports this need for autonomy because these learners view themselves as the initiators of their own actions rather than passive subjects of instruction [9]. Therefore, a stronger internal orientation is expected to support a more self-regulated type of motivation.

In modern higher education, the learning environment has changed significantly with the introduction of various digital tools. These range from established Information and Communication Technologies (ICT), such as online dictionaries, to newer Artificial Intelligence (AI) applications. These tools offer new ways for students to learn independently. However, the impact of these tools is likely not the same for every student. Learners with an internal LoC may use these technologies differently due to their higher sense of agency, which could further influence their motivation. Consequently, the effect of technology on learning is not uniform but depends on the learner's personal characteristics.

To understand this dynamic, a broader research project was initiated to examine the relationships between internal LoC, language learning motivation, and technology use. Specifically, the project aims to determine if technology use acts as a bridge between a student's sense of control and their motivation, and if this differs between using standard ICT tools and AI tools. However, before these complex relationships can be tested, it is essential to ensure that the measurement instruments are valid and reliable for the specific group of students being studied. This paper reports on the initial pilot phase of the research, which focused on two main goals: validating newly created scales for ICT and AI use and testing the initial relationship between Academic LoC and motivation. This step is critical to establish a sound methodological basis for future investigation.

2. LITERATURE REVIEW

2.1. Theoretical Framework: Expectancy and Reinforcement

Based on Social Learning Theory, Locus of Control explains how individuals view the connection between their actions and their results [3]. The core idea is that a student's behavior is guided by their expectation that a specific action will lead to a specific reward. When learners believe that their personal effort directly causes their academic outcomes, they are more likely to change their behavior to improve those outcomes. However, if they perceive that results are controlled by luck or other people, they may not see the point in trying harder, effectively breaking the link between their effort and their success [3].

These theoretical beliefs lead to real differences in how students study and learn. Research indicates that the higher achievement seen in internal learners comes from their ability to manage their own learning and process information effectively [1, 5]. Specifically, students with an internal focus are more willing to work for long-term goals and keep trying when things are unclear. On the other hand, students with an external focus often experience "learned helplessness," where they feel that their actions do not matter, leading them to become passive or anxious when faced with difficult tasks [4, 6, 8].

2.2. Locus of Control and Language Learning Motivation

The connection between Locus of Control and academic success is frequently attributed to the underlying factor of motivation. In the specific context of EFL, research suggests that an internal orientation provides the psychological foundation necessary to sustain the drive to learn. For instance, Ghonsooly and Moharer [10] found that translation students with an internal LoC were significantly more persistent and motivated than their external

peers. They argued that because internalizers view success as a result of their own effort, they are better able to maintain their motivation when faced with complex cognitive tasks, whereas externalizers tend to attribute difficulties to luck or task difficulty, which diminishes their persistence.

This link is further supported by Amini [11], who observed a positive relationship between internal LoC and language achievement among Iranian university students. Drawing on earlier work by Nelson and Mathias, Amini noted that internal LoC is inherently associated with higher self-motivation and greater independence, traits that are essential for mastering a foreign language. Similarly, Elahi and Ghonsooly [12] utilized Dörnyei's L2 Motivational Self System to explain these differences. They found that internally oriented engineering students possessed a clearer vision of their "ideal L2 self," which motivated them to invest more effort in learning English to close the gap between their current proficiency and their future professional goals.

However, the relationship is not always linear. Fakeye [8] highlighted that under certain conditions, a perceived lack of control can actually trigger an increase in motivation, a phenomenon known as "reactance". In his study of Nigerian students, he suggested that some learners might strive harder to regain control over their academic outcomes when they feel threatened by failure. Despite these variations, the dominant consensus in the literature remains that internal control beliefs foster a more autonomous and resilient form of motivation [13].

2.3. The Technological Dimension

As the educational landscape shifts toward digital environments, the interaction between LoC and technology use has become a necessary area of inquiry. Early experimental work by Chang and Ho [14] demonstrated that the effectiveness of technology is not uniform; they found that students with an internal LoC performed best in "learner-control" environments where they could dictate the pace and sequence of instruction. Interestingly, their study also suggested that well-structured digital tools could temporarily benefit external learners by providing the external regulation they lack.

However, the relationship remains complex and often inconsistent. For instance, correlational studies by Chalak et al. [15] and Chalak and Nasri [16] in online EFL contexts found no significant relationship between LoC and academic achievement. These inconsistencies suggest that general measures of "online learning" may overlook the specific ways learners interact with different types of tools.

Consequently, a significant gap remains in understanding the mechanisms linking these variables. While existing studies frequently posit that motivation explains the relationship between internal LoC and achievement, research has rarely tested this direct pathway empirically. More importantly, the mediating role of technology remains underexplored. It is hypothesized that internal learners, driven by their sense of agency, may actively seek out and utilize digital tools more frequently than external learners, and that this increased engagement is what subsequently drives their higher motivation.

To accurately test these hypotheses, it is essential to employ valid measurement tools that capture technology use frequency among EFL learners while distinguishing between traditional ICT and emerging AI applications. Accordingly, this study focuses on validating a research instrument designed to capture these specific patterns of technology use. While established scales were adopted for Academic Locus of Control and Language Learning Motivation, their reliability required confirmation within the current target group. Therefore, this paper reports on a two-phase pilot study aimed at refining the researcher-developed technology scales and re-evaluating the internal consistency of the psychological measures, thereby establishing a sound methodological basis for future inquiry.

3. METHODOLOGY

3.1. Research Design

This study employed a quantitative, non-experimental correlational design. Conducted as the preliminary phase of a larger doctoral research project, the primary objective was to validate the psychometric properties of the research instruments. An iterative two-phase approach was used to test and refine a composite questionnaire designed to measure Academic Locus of Control (LoC), Language Learning Motivation, and specific patterns of technology use (Traditional ICT and AI).

3.2. Participants and Procedure

Data collection took place at a Hungarian university (university of Pécs) across two sequential phases. A snowball sampling technique was employed to recruit the specific target population of university students majoring in English-related disciplines. The sample was drawn from students enrolled in five distinct academic programs: BA in English Studies, MA in English Studies, MA in American Studies, PhD in British, Irish, and American Literatures in English, and the Teacher Training Program.

- Phase 1 (Diagnostic Pilot): The initial sample included 21 learners. This phase aimed to assess the internal consistency of the newly developed technology scales and to establish baseline reliability for the standardized psychological measures.

- Phase 2 (Confirmatory Pilot): Following the revision of the instrument based on Phase 1 data, a second independent sample of 27 students from the same target degree programs was recruited through snowball sampling. This phase served to confirm the reliability of the modified technology scales and to finalize the item pool for the main doctoral study.

3.3. Instruments

1. Academic Locus of Control: This construct was measured using Trice's [17] Academic Locus of Control Scale. The instrument assesses students' beliefs regarding the attribution of their academic outcomes (internal vs. external).

2. Language Learning Motivation: Motivation was assessed using Laine's [18] Language Learning Motivation Questionnaire, which evaluates the intensity and orientation of the learners' motivation to learn English.

3. Technology Use Scales (Researcher-Developed):

    - ICT Use Scale: Designed to measure the frequency of utilizing "traditional" digital tools (e.g., online dictionaries, grammar websites).

    - AI Use Scale: Designed to measure the adoption of generative AI tools (e.g., ChatGPT, AI writing assistants) for learning.

3.4. Data Analysis

Data were analyzed using IBM SPSS Statistics (Version 26). The analysis followed a two-step procedure. First, the internal consistency of all subscales was examined using Cronbach's Alpha (α). Corrected Item-Total Correlation (CITC) diagnostics were utilized to identify and remove items that lowered the overall scale reliability. Second, a Pearson product-moment correlation analysis was conducted to explore the direct relationship between Internal Locus of Control and Language Learning Motivation. Given the sample size constraints and the primary focus on instrument validation, mediation analysis regarding technology use was reserved for the main doctoral study.

4. RESULTS

4.1. Reliability Analysis and Instrument Refinement

The primary objective of the pilot phases was to establish the reliability of the research tools. In Phase 1 (N=21), the standardized scales demonstrated high internal consistency, confirming their suitability for English majors in the Hungarian context. However, the researcher-developed technology scales initially yielded mixed results. While the AI Use Scale showed acceptable reliability, the ICT Use Scale demonstrated poor internal consistency ($\alpha < .60$), indicating a need for revision.

Based on item-level diagnostics from Phase 1, the technology scales were refined. Ambiguous items were reworded, and the item pool was adjusted. Corrected Item-Total Correlation (CITC) analysis identified specific items that continued to underperform:

- ICT Scale: Item 6 ("use of online dictionaries") and Item 5 ("use of multimedia resources") exhibited low CITC values (.052 and .192, respectively). Their removal significantly improved the scale's stability.
- AI Scale: Item 1 ("general use of AI apps") showed a weak correlation with the total scale (CITC = .239) and was subsequently removed.

Following these refinements, the internal consistency for both technology scales improved substantially in Phase 2, exceeding the threshold for acceptable reliability. Table 1 presents the comparison of reliability coefficients across the two phases.

Table 1. Comparison of Reliability Coefficients (Cronbach's Alpha) Across Pilot Phases

Scale	Phase 1 (N=21)	Phase 2 (N=27)	Final Status
Language Learning Motivation	0.969	.969*	Retained
Academic Locus of Control	0.885	.885*	Retained
ICT Use Scale	0.55	.807**	2 items removed
AI Use Scale	0.769	.824**	1 item removed

Note. * Reliability values for standardized scales remained stable. ** Reliability reported after the removal of problematic items

4.2. Correlation Analysis: Locus of Control and Motivation

To address the first research question regarding the relationship between learners' Locus of Control and motivation, a Pearson product-moment correlation was calculated for both samples.

In Phase 1, the analysis revealed a statistically significant, moderate positive correlation between Internal Locus of Control and Language Learning Motivation ($r = .51$, $p = .018$). This suggests that the students who possess a stronger sense of personal agency report higher levels of motivation.

In Phase 2, the relationship remained positive ($r = .33$) but did not reach statistical significance ($p = .089$). Despite the lack of statistical significance in the second phase, the consistent directionality of the coefficient across both independent samples supports the theoretical hypothesis. Table 2 summarizes these findings.

Table 2. Pearson Correlation Between Academic LoC and Motivation Across Pilot Phases

Pilot Phase	Sample Size (N)	Pearson's r	Sig. (2-tailed)	Interpretation
Phase 1	21	.51*	0.018	Moderate Positive Correlation (Significant)

Phase 2	27	0.33	0.089	Weak-to-Moderate Positive Correlation (Non-Significant)

Note. * Correlation is significant at the 0.05 level (2-tailed).

5. DISCUSSION

5.1. The Validation of the Technology Scales

The primary methodological contribution of this pilot study is the successful development and validation of an instrument capable of distinguishing between ICT and AI technologies use for learning for the main doctoral study. While the initial diagnostic phase revealed inconsistencies in the preliminary ICT scale, the subsequent systematic refinement (involving item rewording and specific deletions) resulted in a sound measure. The final internal consistency coefficients for both the ICT (α= .807) and AI (α = .824) scales demonstrate that the revised instrument now meets the psychometric standards required for empirical academic research. Consequently, the refined questionnaire is fully operational and ready for use in the large-scale investigation.

5.2. The Relationship Between Locus of Control and Motivation

The correlational findings from both pilot phases provide preliminary empirical support for the theoretical framework grounded in Self-Determination Theory [9]. The significant moderate positive correlation observed in Phase 1 (r = .51) aligns with established literature suggesting that English majors who perceive themselves as the primary agents of their academic outcomes tend to possess a more self-sustaining motivational drive.

Although the correlation in Phase 2 did not reach statistical significance (p = .089), the directionality and magnitude of the relationship (r = .33) remained consistent with theoretical expectations.

5.3. Implications for the Main Study

These pilot results serve as a vital diagnostic function. They confirm that the core psychological constructs (Academic LoC and Motivation) are stable within the Hungarian EFL context. More importantly, the successful validation of the technology scales ensures that the subsequent investigation into the mediating role of AI and ICT will be based on psychometrically sound data. The main study, with a projected sample of N=250, will possess sufficient statistical power to test the complex mediation hypotheses of technology that could not be examined in this pilot phase.

6. CONCLUSION

This paper reported on the pilot stage of a doctoral research project aimed at exploring the relationship between Academic Locus of Control, Language Learning Motivation, and Technology Use among Hungarian EFL university students. The primary objective was to validate a composite research instrument, with a specific focus on refining a researcher-developed measure capable of distinguishing between the use of traditional ICT tools and emerging AI applications.

The results confirmed that the standardized psychological scales adopted for this study possess high reliability within this specific educational context. Furthermore, through a systematic two-phase refinement process, the internal consistency of the newly developed ICT and AI scales was improved to satisfactory levels (α > .80). Preliminary data also indicated a positive relationship between internal locus of control and language learning motivation, although the statistical significance of this association varied due to the limited sample sizes of the pilot groups.

With the validity and reliability of the measurement tools now established, the research will proceed to the main data collection phase involving approximately 250 participants. This study will utilize the refined instrument to examine whether technology use mediates the link between students' sense of control (Academic Locus of Control) and their motivation to learn English, contributing new perspectives to the field of EFL in the digital age.

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The Implementation of Management Information Systems and Their Impact on School Management

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Abstract

A management information system is an application that provides information and news related to activities that support and improve school operations. The purpose of a management information system is to meet all information needs within the school. All activities within the school generate useful information for both the school and external stakeholders in the execution of school activities. With an information system in school management, all activities can be automated, and efficiency and operational performance can increase in every need. With an information system in the school, information from outside the school reaches the school quickly and can definitely support school activities. In the study the implementation of Management Information systems (MIS) and their impact on School management has been aimed under the light of literature. It has been concluded that in school management, every human resource needs to play an active role in improving the quality of the school. If only the principal is involved, the school will not achieve its educational goals. A management information system can help schools take the best steps to advance their future.

Keywords: Management Information System, Educational Management, Information System Application, Educational Policies

1. INTRODUCTION

Technology has developed rapidly today. In today's world, technology significantly assists human endeavors in both personal and public spheres. Information technology includes processed and systematically organized data. Using an information system, all tasks such as taking student and teacher attendance at school become easier. Attendance can now even be recorded online. The use of increasingly advanced science and technology can improve the quality of learning.

In today's age of globalization, organizations increasingly need information systems, particularly to improve the health of information flow within the organization, control quality, and forge alliances or collaborations with other parties. A management information system will help organizations integrate data, accelerate and predict data processing, improve information quality and manage control, and enhance management services. Therefore, information within an organization is crucial for supporting its continuous development, justifying its critical need for information. A lack of information can ultimately affect an organization's ability to control resources, hinder strategic decision-making, and ultimately lead to competitive defeat.

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Information is a fundamental management requirement for fulfilling management functions. Undoubtedly, management success is greatly influenced by and depends on the accuracy of the information provided. Management needs a rich body of information to operate as efficiently and effectively as possible. This information assists leaders or management in decision-making. However, management cannot fully utilize this vast amount of information. Therefore, a system is needed to support management's needs in managing an organization. Furthermore, a good system will promote high productivity and contribute to achieving organizational goals.

An information system can be defined as a system that mobilizes and functions various combined components, including people, facilities, media, technology, and procedures, to produce information used within an organization that is important to the organization. Currently, many schools at all levels use online systems for new student registrations. This allows each school to easily access data and information regarding new student admission criteria.

The implementation of a management information system in schools can help simplify school operations, for example, in the processing of school data. Furthermore, a management information system is beneficial in increasing effectiveness and efficiency through accurate data collection while ensuring data security. The purpose of a management information system is to provide information about data that is useful and important to its users. Therefore, in the education sector, especially in schools, the implementation of a management information system is necessary not only as a support system but also as a vital tool in conducting school activities, ensuring effective and efficient school operations, obtaining more accurate and reliable information, and ensuring data security.

Based on the explanation above, the questions in this article are: (1) What is a management information system? (2) What is the purpose of management information system? (3) What are the benefits of management information system? (4) How can a management information system be applied in school system?

2. MANAGEMENT INFORMATION SYSTEMS

School management requires the activity of organizing and managing current school activities. Thanks to a school management system, the principal will be able to easily carry out school management activities. Over time, school management needs a system. This system aims to quickly facilitate school management activities, thus making school management effective and efficient. This system is called a management information system. A management information system aims to assist schools in the decision-making process, thus saving time, energy, and thought. Since schools are supported by an application that provides school data, this can facilitate decision-making for future school development.

A management information system is a computer-based system that provides its users with a variety of information they need. This information describes, among other things, what happened in the past, what is happening now, and what might happen in the future. Managers and other personnel when making decisions to solve problems often present this information in the form of reports that are frequently used. It is a method by which information users transform data into information, which is then used as a basis to be considered in the decision-making process.

Meanwhile, according to Utami (2011), a management information system is an integrated human or machine system that provides information to support operations, management, and decision-making functions within an organization. This system uses software, computer hardware, procedural guidelines, management and decision-making models, and a database.

According to Hartono (2013), an information system is a set of interconnected components that collect, store, and transform data into usable information.

According to Koontz (1980), management is the process of enabling everything to be accomplished through the cooperation of people in an organized group. Therefore, a management information system is a neatly organized, interconnected set of components that generate information to be processed within an organization.

A management information system is a set of interrelated components that must be considered in the decision-making process, the storage and sharing of various information to support performance within an organization or institution.

According to Raymond McLeod, a management information system is a method of providing the information an organization needs to operate successfully and profitably.

According to Robert W. H. Rochaety (2009), a Management Information System (MIS) is a system designed to provide selected, decision-oriented information needed by management to plan, monitor, and evaluate organizational activities within a framework that emphasizes profit planning, performance planning, and monitoring at all stages.

From the above explanation, it can be concluded that a Management Information System (MIS) is a system that provides multiple users with an appropriate amount and quality of information for use in the decision-making process in management activities within an organization, thus helping leaders to improve and enhance the quality of the organization they manage (David, 2019; Wayne, 2023; Toprak and Yakar, 2023).

2.1. *Purpose of a Management Information System*

The purpose of an information system is to produce information. Information is data transformed into a useful form for its users. For information to be useful, it must be built on three fundamentals: the right person, the right time, and the right value. All organizations need a flow of information that helps managers make decisions. The purpose of establishing a management information system is to ensure that organizations have a system that can transform data into useful information for decision-making within the organization. The purpose of this management information system is to facilitate the data processing efforts of schools or other organizations and to facilitate user access.

In general, the purposes of a management information system can be summarized as follows:

- To help provide complete information to relevant parties,
- To provide transparent information to the public,
- To provide users with easy and complete access to information,
- To ensure greater security of stored data,
- To collect data and information to support decision-making,
- To use to calculate the price and cost of a product or service according to management's needs,
- To provide information to assist leaders in decision-making.
- To provide information to assist leaders or the organization in performing management functions, namely planning, organizing, activating, and controlling.
- To provide information needed by management to help the organization achieve its goals.
- To provide information to help improve and enhance the quality of the organization.
- To facilitate school data processing activities.
- To save time in information gathering activities.
- To assist in the decision-making process.
- To facilitate teachers' work in preparing student reports.
- To assist the school principal in analyzing school data to determine appropriate policies for future school development.
- To assist in school promotion.
- To facilitate access to external information for school development.
- To minimize data errors.

The purpose of a management information system is to provide various information quickly and in a timely manner to guide the decision-making process from planning to the final stage of control.

A management information system is very beneficial and useful for society, especially in the field of education. One of its benefits is that it facilitates planning, control, direction, and delegation of authority within coordination lines by increasing the effectiveness and efficiency of accurate information and data. An information system can increase efficiency and reduce costs. Therefore, it can overcome the obstacles of the lack of information received by the organization.

In general, a management information system aims to meet the overall information needs of an organization, from companies to schools. This management information system is an implementation of an organizational information system that is useful in meeting all management information needs to achieve management objectives. Therefore, good management of MIS is essential for achieving effective and efficient goals.

2.2. *Benefits of Management Information Systems*

Educational institutions usually gain various benefits by using a school management information system; These include the availability of educational data and information management systems, the integration of educational data and information to support the decision-making process, and the availability of comprehensive educational information for all stakeholders within the education system. The school management information system is used as a decision-making tool and by other parties in the inter-institutional information system, enabling educational institutions to interact with stakeholders.

If an organization can manage its MIS well, it will reap various benefits from the MIS itself. A well-managed management information system will help leaders or managers plan, supervise, direct, and delegate tasks to all team members through effective coordination. This management information system also presents data more effectively, efficiently, accurately, and in a timely manner. Furthermore, a management information system can be used to increase organizational efficiency.

As Ramadanti & Sabandi (2019) point out, one of the areas where MIS can be implemented in organizations is Personnel Management Information Systems. This, of course, aims to make it easier for every leader and employee to obtain information on all matters related to employees.

3. IMPLEMENTATION OF INFORMATION SYSTEMS IN SCHOOL MANAGEMENT

The implementation of information systems in school management is challenging due to numerous obstacles encountered during implementation. One of these problems is internet access. Wi-Fi is essential for internet access, but the network is not equally distributed to every room and corner of the school. Another obstacle is computer usage; Teachers often struggle with using computers. This is because they are not accustomed to using computers, making it difficult for them to enter student data and grades into the school's IT system. However, not all teachers have trouble with computer use; some, particularly older teachers, struggle. This stems from their age and memory difficulties, and can lead to decreased motivation for learning. In addition to decreased motivation, older teachers often assume they will never be able to use technology. This situation often leads to reluctance among older teachers to learn how to use technology. Furthermore, there is a lack of resources, such as computers, to support the implementation of management information systems in schools. This results in teachers continuing to use outdated classroom methods that involve more homework rather than interactive learning processes. This ineffective and unfavorable environment leads to decreased student enthusiasm for learning and a decline in the quality of learning for both teachers and students (Sabandi, 2019).

Teachers' willingness and motivation to use management information systems are assessed as low. Some teachers rely solely on school operators to enter student data and information, leading to the management information system not functioning as intended. This results in a backlog of tasks and ineffective use of school information systems. Collaboration among various parties is essential to ensure a well-organized information system for school management: principals, teachers, supervisors, and the education office. To improve and enhance information systems in schools, school principals can have greater oversight and control over teachers' activities in the use of management information systems. Furthermore, resources such as computers in schools should be increased, and training in information systems should be improved to eliminate excuses for teachers' inability to use technology. Moreover, teachers can improve their competence in using technology, especially in management information systems, if resources allow. School administrators can monitor and supervise the use of management information systems in schools. The education office can also facilitate school needs through assistance, provision, and training to increase teachers' competence in using technology.

The implementation of a management information system in schools can help simplify school operations, for example, in the processing of school data. Furthermore, a management information system is beneficial in increasing effectiveness and efficiency through accurate data collection while ensuring data security. The purpose of a management information system is to provide information about data that is useful and important to its users. Therefore, in the education sector, especially in schools, the implementation of a management information system is necessary not only as a support system but also as a vital tool in conducting school activities, ensuring effective and efficient school operations, obtaining more accurate and reliable information, and ensuring data security.

Management information systems are implemented in education through the management of Basic Educational Data (BED). It includes data about educators, educational staff, students, facilities, and infrastructure, etc. Basic Educational Data is a system for collecting and managing educational data at the micro level online and in real time. It aims to increase efficiency, effectiveness, and synergy in collecting basic data integrated within a single data system. In its application in schools, MIS is used to process data, including data collection, data processing, and data storage.

- *Data Collection Section*

The data obtained consists of internal and external data. Internal data is obtained from all organizational work units, including the vice principal, while external data can be obtained from the environment. Data collection requires planning, defining objectives, determining data types and data collection time, and ensuring data security.

- *Data Processing*

Data processing procedures must be followed. Data processing involves a series of steps to transform data into useful information using a computer and then input it through the BED data manager.
Data processing using established procedures should avoid errors, including:

- Connecting supporting equipment for code detection
- Ensuring the program used error-free
- Checking the compatibility of previous programs with the new program used
- Availability of procedures.

- *Data Storage*

Data storage must be secure because this data is very important and must be protected from unforeseen events. Therefore, the implementation of a management information system is expected to ensure data security. Data storage is carried out so that users can easily access it anytime and anywhere. Data storage or Information storage is crucial to ensure security, cost-effectiveness, and ease of searching and retrieving when needed.

A school is considered successful if it can meet all customer needs such as students, educators, parents, and the community. As a support system for educational institutions, MIS (Management Information System) should be able to provide information services that are tailored to user needs and easily accessible. In general, information services can be defined as activities whose results benefit others, individuals, groups, and the community.

Information services in a school are an effort to ensure user satisfaction by meeting user needs and continuously improving the services offered. Information services are not only offered to students and parents; MIS implemented in schools also includes: financial information systems, facilities and infrastructure information systems, curriculum information systems, and student information systems.

Briefly, to improve services in a school, we need to implement the functions of a management information system. With a management information system, schools can use it to provide accurate, relevant, and timely data. Automatedly, a management information system can help provide stakeholders with information quickly and accurately based on the information integrated into the management system.

3.1. *Application of Management Information Systems in Decision Making*

In its application, a management information system plays a crucial role in enabling decision-makers to make informed choices by presenting them with various efficient options. As previously stated by Lipursari (2013), decision-making is the result of problem-solving, the legal answer to a question, and the selection of an alternative among the available alternatives, as well as the thought process related to the problem or issue under consideration. The result of decision-making is also a decision.

Every organization needs accurate, precise, reliable, and relevant information that suits its needs. The information an organization receives can be obtained from external sources. Therefore, simply not every piece of information an organization receives is acceptable. This information will help leaders make decisions and solve the various problems the organization faces. Therefore, a management information system is tasked with filtering information according to the organization's needs to support effective decision-making.

3.2 Obstacles with Application of Management Information Systems in Schools

Teachers' willingness and motivation to use this management information system is assessed as low. Some teachers rely solely on school operators to enter student data and information, which leads to the management information system not functioning as intended. This situation leads to a backlog of tasks in the school and ineffective use of information systems. Various reviews have shown that many teachers in schools do not fully utilize management information systems due to a lack of awareness of the importance of implementing management information systems for both themselves and the school. Some teachers believe they are no longer young and cannot easily understand how to use information systems effectively. Others consider the use of management information systems unnecessary, leading many teachers to continue ignoring them and preferring to use manual systems for data collection.

The current implementation of the management information system in the school is not functioning well and effectively. This is due to various obstacles that prevent the proper implementation of the information system. These obstacles may stem from teachers' inability to use and process data through system or computer knowledge. This may be due to the aging of teachers in the school, making it difficult for them to understand computer technology for data processing. This aging factor may lead to teachers losing their enthusiasm for learning and exploring information systems, which can be challenging for them. Another obstacle is inadequate network connectivity at the school, which makes it difficult for teachers to access and process information. Furthermore, there is a lack of equipment and facilities to support the implementation of technology-based management information systems at the school.

Successful implementation of technology-based management information systems requires collaboration among various stakeholders, including the principal, teachers, supervisors, and the education office. This will ensure the effective, efficient, and successful implementation of management information systems in schools.

4. CONCLUSION

A management information system can help schools manage their operations, particularly by analyzing data for decision-making. It assists schools in identifying alternatives for decision-making. If decisions are consistently correct, the quality of the school will undoubtedly improve, and school management will be effective and efficient.

In school management, every human resource needs to play an active role in improving the quality of the school. If only the principal is involved, the school will not achieve its educational goals. A management information system can help schools take the best steps to advance their future.

With this management information system, it is hoped that every school will use it effectively, as it significantly helps schools improve their quality. Furthermore, every school should monitor developments to ensure they stay on track and can improve their quality in line with current developments.

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Transport, Logistics, Tourism and Sport Science (IAC-TLTS)

Opportunities from Digitalization of Sports Events and Their Impact on the Development of Sports Tourism: Example of Local, Regional and International Events

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Abstract:

This paper aims to open up the opportunities offered by digitalization for the promotion of sports events and their impact on the development of sports tourism, regardless of whether it is a local, regional or international level. Sports tourism is one of the most dynamic segments of the tourism industry, where sports and sports events are the main reason for travel and visits to various destinations. It not only attracts sports fans, but also has a significant economic, social and cultural impact on communities. The aim of this paper is to examine how digitalization as a process affects the promotion of sports events that stimulate tourist activity, and how they then affect the local economy, and at the same time to analyze examples from local, regional and international sports events. The conclusion of this paper is that digitalization is the future in the field of promotion of sports events that have had a strong impact on the development of sports tourism in general. Methodologically, this paper is based on an analysis of literature, including books, textbooks and scientific articles, statistical data, as well as the number of participants, attendance at sports events, economic benefits, examples from practice such as local, regional and international sports events. They create economic, social and cultural benefits for local communities. For the future, it is important to invest in infrastructure, promotion and organization of events, in order to exploit all the potential benefits of sports tourism.

Keywords: digitalization, sports management, sports event, sports tourism

1. INTORDUCTION

This paper aims to open up the opportunities offered by digitalization for the promotion of sports events and their impact on the development of sports tourism, regardless of whether it is a local, regional or international level. Sports tourism is one of the most dynamic segments of the tourism industry, where sports and sports events are the main reason for travel and visits to various destinations. It not only attracts sports fans, but also has a significant economic, social and cultural impact on communities. There is no doubt that innovative technologies and their appropriate application are the driving force behind the development of various economic and business sectors. Today, digitalization, or digital transformation, represents key global trends in the world economy, a process of transformation of society and the economy, but also a prerequisite for the survival, growth and development of companies on the domestic and global markets.

The goal of this paper is to examine how digitalization as a process affects the promotion of sports events that stimulate tourism activity, and how they affect the local economy and to analyze examples from local, regional and

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international sports events. The sports industry is undergoing rapid change, and in this it is not significantly different from other industries, and digital technology offers unprecedented opportunities for growth. Digitalization in sports implies the implementation of digital technology in all aspects.

The digitalization of sports events presents significant opportunities for the development of sports tourism by increasing fan engagement, simplifying operations and improving the branding of destinations, with a key difference in scale and impact between local and international destinations.

1.1. Theoretical Background

1.1.1. Definition of sports events

Sports events are not just a game; they are a celebration of social ties and understanding between different cultural traditions. In my opinion, very few, if any, scientists in our country have taken a serious interest in what sports events represent and what they actually mean. Very few experts and scientists have tried to define what sports events represent, what their social role is, what values they promote, and other similar activities.

In my doctoral thesis, for the first time, I give a specific definition of what sports events represent, regardless of whether it is a local, regional or international event, I quote: *sports events are a form of public event that stimulates the behavior of several thousand people in a certain period of time.* (Anastasovski, 2010).

On the one hand, sports events (Anastasovski, 2026) represent a small simulation of a struggle for a result. Such a struggle for a result, especially on an international competitive level, causes emotional charge in people from several aspects. But, in contrast, on the other hand, sports events and sports competitions can sometimes serve as real entertainment and enjoyment for spectators, enjoyment of fair play, skill in manifesting physical activity, etc.

1.1.2. Definition of sports tourism

Sports tourism refers to travel which involves either observing or participating in a sports event while staying apart from the tourists' usual environment. Sports tourism is one of the fastest-growing sectors of the global travel industry.

Sports tourism is a type of tourism where participation in or attendance at sports activities and events is the main reason for travel.

Sports tourism is divided into:

1. Active sports tourism – participation in competitions or training (e.g., participation in marathons).
2. Passive sports tourism – viewing sports events (e.g., attending football matches).
3. Recreational sports tourism – tourist activities with a sports component (e.g., hiking, skiing).

1.1.3. Definition of digitalization

Digitization is the process of converting analog information into a digital format. In this format, information is organized into discrete units of data called bits that can be separately addressed, usually in multiple-bit groups called bytes.

Digitalization is the process of leveraging digital technologies to transform a business model, creating new revenue streams and value-producing opportunities.

According (McQuail, 2000) digitization is of crucial importance to data processing, storage, and transmission, because it "allows information of all kinds in all formats to be carried with the same efficiency and also intermingled.

1.1.4. Digitalization in the sports industry

Digitalization in the sports industry is the process of using digital technologies, software and applications to improve the organization, management and marketing of sports activities, clubs and events. Digitalization in the sports industry is a great opportunity and benefit that can be used to promote a sports event (local, regional or international) very easily, quickly and simply.

Example: Using applications for registration of matches, tracking results, analyzing performances and communicating with fans.

1.1.5. Digitalization in sports tourism

Digitalization in sports tourism is the use of digital tools, platforms and internet services to facilitate tourism activities related to sport, such as online bookings, virtual events and digital marketing of sports destinations.

Example: Booking a hotel and tickets for a marathon through an application or following a football match live through a streaming platform.

1.2. Goal and tasks of the paper

The goal of this paper is to analyze process of digitalization who would have an impact on sports events that would contribute to the development of sports tourism, both locally and regionally, and internationally.

The tasks of the paper are:

1. To define sports events and sports tourism.
2. To present examples from local and international events.
3. To analyze the economic, social and cultural benefits.
4. To consider challenges and opportunities for development.
5. To analyze the digitalization process.

1.3. Methodology

Data collection relied on two complementary methods. This paper is based on the following methodology: analysis of literature including books, textbooks and scientific articles, statistical data, as well as number of participants, attendance at sports events, economic benefits, examples of practice such as local, regional and international sports events. Social media platforms such as: Facebook, Instagram, Twitter, TikTok and YouTube were also used, as well as official websites, press releases, blogs and digital campaigns that included hashtags, videos and podcasts. The data collected were for all types of sports events (local, regional and international) and ranged from 2020 to 2023 year.

This paper also leaves room for further research: by surveying a certain number of tourists who attended sports events regardless of the type of event.

1.4. Main point of the paper

1.4.1. Relationship between sports events and tourism

The fact is that sports events have a strong impact on both traditional and sports tourism, (illustration 1). All this is reflected in several benefits, namely:

1. Economic benefits (EB): tourists spend money on accommodation, food, transport and souvenirs.
2. Social benefits (SB): job creation, increased local activity and community.
3. Cultural benefits (CB): promotion of the culture and traditions of the destination.

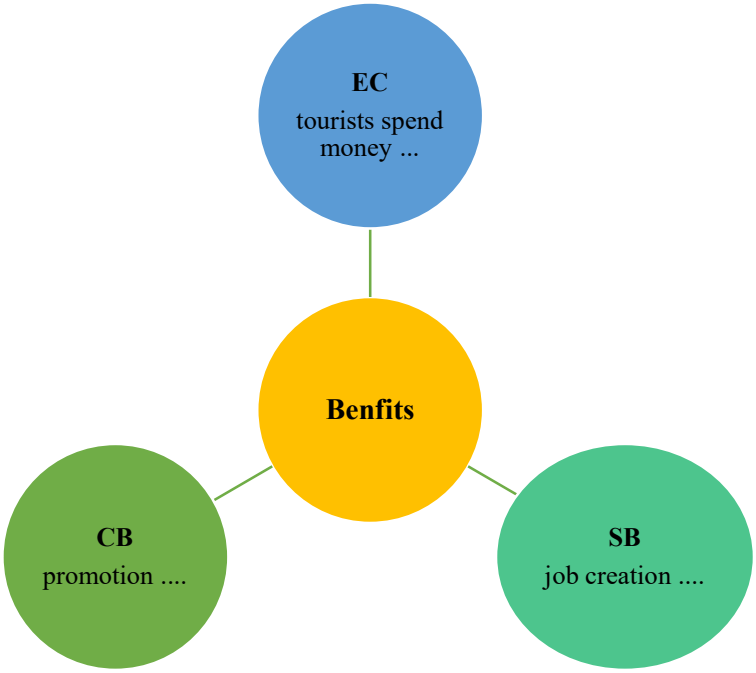

Fig. 1. Benefits of digitalization of sports events for the development of sports tourism

1.4.2. Examples of sports events

a. Local and regional sports events:

1. Skopje Marathon: attracts participants from neighboring countries and promotes the capital.
2. Football matches in Macedonia: regularly gather fans and tourists from the region.

b. International sports events:

1. Olympic Games: attract tourists and media attention globally.
2. Tokyo 2020 Olympic Games: attracted more than 11 million tourists and created an economic impact of about $13 billion.
3. Tour de France: a cycling race that attracts thousands of spectators from around the world.

Table 1. Tabular presentation of sporting events that are part of the analysis of this paper

Sports events	Location	Year	Number of tourists	Type of events
Skopje Marathon	*Skopje, Macedonia*	*2023*	*2.500*	*Local*
National football competition (*NFC*)	*Deferent city in Macedonia*	*2023*	*10.000*	*Local/Regional*
Olympic game	*Tokyo, Japan*	*2020*	*11.000.000*	*International*
World football cup	*Qatar*	*2022*	*1.200.000*	*International*
Touré De France	*France*	*2023*	*3.500.000*	*International*

1.4.3. Challenges and opportunities

From the perspective of what are the potential challenges in the process of organizing sports events, but at the same time the opportunities from the digitalization of sports events for the development of sports tourism, the paper points out three challenges and three opportunities (illustration 2), as follows:

What are the possible challenges in the process of organizing a sports event, regardless of whether it is a local, regional or international level:

1. High costs for organizing the event, as well as for the infrastructure.
2. Unequal distribution of benefits in the local community.
3. Impact on the environment.

What are the opportunities from the digitalization of sports events for the development of sports tourism:

1. Promotion of destinations and local products.
2. Development of tourism in rural and less visited areas.
3. Encouraging sports culture and healthy habits among he population.

Possible challenges in the process of organizing a sports events

High costs for organizing the event, as well as for the infrastructure
Unequal distribution of benefits in the local community
Impact on the environment

Opportunities from the digitalization of sports events for the development of sports tourism

Promotion of destinations and local products
Development of tourism in rural and less visited areas
Encouraging sports culture and healthy habits among the population

Fig. 2. Illustrative presentation of challenges and opportunities

1.4.4. Digitalization of sports tourism

Digitalization means using technologies, the internet and digital tools to improve and facilitate sports tourism.

a. Ways of digitalization:

1. Online bookings: Tourists can book trips, accommodation and tickets for sports events through applications or websites.
2. Virtual events and streaming: The ability to follow sports competitions or marathon races online, which increases the global audience.
3. Travel guide applications: Guides to sports destinations, tracks, stadiums, sports clubs and activities.
4. Social networks and marketing: Promotion of sports-tourism destinations through Facebook, Instagram, TikTok and other platforms.
5. Big data and analytics: Tracking the number of tourists, interests, habits, to improve the offer and plan events.

b. Benefits of digitalization:

The benefits of digitalization (D) (illustration 3) of sports events that have the potential to develop sports tourism are as follows:

1. Easy access to information and services (EAIS).
2. More tourists from all over the world (MTOW).
3. Better organization and planning of sports events (BOPSE).
4. Increased economic and promotional effects (IEPE).

Fig. 3 Illustration of the benefits of digitalization of (SE) and promotion of (ST)

2. CONCLUSION

One thing can be said for sure that digitalization is the future in the field of sports event promotion, which has had a strong impact on the development of sports tourism in general. They create economic, social and cultural benefits for local communities. For the future, it is important to invest in infrastructure, promotion and organization of events, in order to exploit all the potential benefits of sports tourism.

According to all the findings in this paper, the following can be concluded:

1. Digitalization significantly increases the visibility and global reach of sports events. Research shows that the use of digital platforms (streaming, social networks, mobile applications) allows sports events to reach an international audience, which directly affects the increase in tourist interest and the number of visitors to the destination.
2. Digital technologies improve the experience of tourists and participants. The application of technologies such as mobile applications, e-tickets, virtual guides and interactive maps increases the satisfaction of sports tourists, which leads to greater loyalty and repeat visits.
3. Online marketing and data analysis enable more effective tourism promotion. Digitalization enables the collection and analysis of data on visitor behavior, which helps organizers and tourism institutions to create targeted marketing strategies and personalized tourism offers.
4. Virtual and hybrid sports events extend the economic effect of tourism. Scientific papers indicate that virtual broadcasts and online participation provide economic benefits even for those who do not physically travel, while motivating future visits to the destination.
5. Digitalization contributes to the sustainable development of sports tourism. Digital solutions reduce costs, paper documentation and the ecological footprint, which is in line with modern models of sustainable tourism.
6. Technological innovation strengthens the competitiveness of tourist destinations. Destinations that invest in the digitalization of sporting events are perceived as modern and innovative, which gives them a competitive advantage in the global tourism market.

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Comparative Analysis of international vs. Albanian Underused Industrial Sites Regeneration

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Abstract

Industrial patrimony is one of the most important, but sometimes under-evaluated, assets of our heritage. Most of nowadays industrial sites are consequence of industrialization process. Due to post-war developments and changes of economic policies, a large number of industrial sites have been reused for cultural, educational, residential or economical purposes.
The industrialization process in Albania started at the XIX century, but the greatest development happened during the communist period (1945-1990). Parallel to land privatization, the change of regime was followed by closure and harassment of innumerable sites and objects. For more than two decades, most of the largest industrial sites were out of function or partially privately used. With the approval of Albanian Local General Plans of cities, it has become a primary purpose the designation of land use and regeneration of these "silent assets" which now have the opportunity to become the promotors of cities developments.
Taking in consideration worldwide positive examples of underused industrial sites regeneration, this study provides a comparative analysis towards the Albanian case. The work was based on various on-site visits of local deteriorated industrial sites and further desk research (historic and literature review) regarding possible and successful approaches. Facing absent local experiences and the urge of overall regenerations evolving nowadays in country, this study gives contribution of possible regeneration instruments using most suitable positive worldwide experiences. Furthermore, this study provides very interesting documentation of Albanian industrial sites, which information is lacking in international level, hence contributing the promotion of this heritage in national and international level.

Keywords: industrial heritage; industrial archaeology; underused site; sustainable development

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1. INDUSTRIALIZATION HISTORY IN ALBANIA

All regions face similar challenges in delivering sustainable transport solutions to meet their current and future mobility requirements. Transport authorities are aware of the real needs specific to their region but often find it difficult to identify detailed information on targeted solutions that would deliver direct and tangible positive outcomes.

The evolution of Albanian's industrial heritage is closely linked to political and historical changes through years. Industrialization of the country started at the end of 19th century with the investments of Italian, French, Austrian and English companies in mining and extraction (raw materials, coal, petroleum, copper, silver, gold), electricity, wood processing and production, textiles (leather, carpets, clothing, shoes), food processing (rice, candy, pasta, tobacco, oil, bread, soap etc.) and production of construction materials (bricks, cement).

The creation of communist state, after the Second World War, was followed by closure of alliances with western countries and lead towards eastern ones. Many industrial sites were severe damaged and the country was in deep poverty. The authoritarian policy of the leader, was materialized with the realization of strict planning as follows:

a) One-year plans of 1946, 1947, and 1948; during the short alliance with ex-Yugoslavia, when many factories and bridges were reconstructed. Most noticeable investments were the conclusion of first railway in country from Durres to Peqin (originally initiated by the Italians and left unfinished by World War II) and extension of hydropower in Selita (Tirana).

b) Two-year' plan 1949-1950, mostly focused in road infrastructure and railway lines. This period also marks the initiation of close relations with ex-BRSS, 1949-1961, combining Russian geopolitical interest with mutual trade exchange.

The other subsequent five-year plans were based in the soviet model of economic development which proclaimed the intensive use of raw materials and energy. Market exchange included the export of minerals and agricultural products from Albania and the import of industrial equipment and food base (as wheat and fertilizers for agriculture).

c) First five-year plan 1951-1955 was focused in the changes of economic base from agricultural to industrial one. Investments were addressed to light and construction industry and electricity sector (as TEC in Tirana). New plants of light industry were constructed all over the country as the "Stalin" textile combine in Tirana, the "Misto Mame" wood processing mill in Tirana and "Nako Spiru" in Elbasan, the "Lenin" cement factory in Vlora, the "Partizani" mechanical plant in Tirana, some state rubber enterprises, brick factories and food factories (as cotton, oil, sausage, tobacco). There was immediate need for qualified workforce and scientific local base, which was supported by the assistance of many soviet specialists, transferred to work and live in Albania.

d) Second five-year plan 1956-1960 involved the application of agrarian reform, by transferring private property to collective one and creating cooperatives. Under the slogan "land belongs to the tiller", many land owners were expropriated and distributed to poor and landlessness villagers. On the other hand, extraction industry carried on contributing exportations of nickel, chrome, coal and oil. Factories for conservation and processing of fruits and vegetables or other food factories were constructed even in small ones. Upon all, can be pointed the Glass factory in Korça, "Ali Kelmendi" food combine and Porcelain Factory in Tirana, Brick factory in Vlora and Shkodra, "Ernest Telmani" combine for conservation of fish and fruits in Vlora, Oil processing factory (U.P.N) and Center of Oil Processing (Q.P.N) in Kuçova, iron-nickel and coal mines in Pogradec, Kukes and Perrenjas, copper mining in Rreshen, etc.

e) Third five-year plan 1961-1965 marks the end of alliance with ex-BRSS and the raise of a new one with the Republic of China. Taking in consideration that most of investments were made in industrial sector, heavy industry became very expensive and unsustainable. Although local economy was guided to the modernization of other economic sectors, heavy industry remained one of the most important adsorptive investments. Often happened that economic growth figures were fictitious, because of compelling propaganda and needs of the workers to receive higher rewards in case of greater productivity. Further investments were also done in light and food industry (as shoe and knitwear factory in Korça and Shkodra), construction materials production, mechanical mills as in Kavaja, wood combine in Laç, construction of new naval shipyard in Durres, cooper mine and processing in Kukes, Puka and Miredita; sulphur acid factory in Laç, Hydropower "Frederick Engels" in Milot, paper processing factory in Lushnja, wires factory in Shkodra, "Dinamo" Mechanical plant in Tirana, State Industrial Enterprise of salt in Narta (Vlora), etc.

f) Fourth five-year plan 1966-1970 was the period of economic and industrial stabilization. The most distinguished sites of the time were "Mao Ce Dun" textile combine in Berat, the initiation of "Steel of Party" metallurgical complex, the factory of artistic production in Berat, the mechanical factory in Peshkopia, the

electromechanical factory and radio-tv factory in Durres, brick state industrial enterprise and the plastic one in Durres, cement factory in Elbasan, refining plant in Fier, Rrogozhina-Fier railway, porcelain and glass factory in Kavaja, food and mechanical factories in Korça and Shkodra, superphosphate factory in Laç, etc. The railway transport witnessed deep changes with the introduction of new system introduced by Czechoslovakian engineers.

g) Fifth five-year plan 1971-1975 was mostly focused in the construction of the Metallurgical Complex of Elbasan, "Steel of Party". In an area of about 60 ha, the also known as the heart of black industry involved 520 small and large factories. The party's tasks through this plan, included the self-reliance doctrine to strengthen economic independence and workforce level (more than 50 % of workforce was by party members); improve quantity and quality of industrial production but also increase of agricultural production. Industrial factories continued to be constructed, mostly for food and light industry (as in Tirana, Berat, Durres, Gjirokastra, Korça, Përmet), chemical (Durres, Fier), mechanical (Gjirokastra, Lushnja, Shkodra, Vlora, Tirana), New tractor plant "Enver Hoxha" Tirana.

h) Sixth five-year plan 1976-1980 coincided with the last period of alliance with China and increment of self-sufficiency aspiration. As consequence, the party's aim was to advance the industrial and agricultural production, the defense potential and to invest more in technical studies. Most of construction works were focused on defense (tunnels, bridges and bunkers), chemical and food industry (Fier, Tirana).

i) Seventh five-year plan 1981-1985 was focused on self-sufficiency, use of intern stocks (existing manufacturing capacities1[1]) and fallout of political and economic relations with any other countries. Very few industrial factories were constructed during this period, as the tobacco factory and new battery implant in Berat, oil factory in Lezha and Shkodra, and completion of Fier-Vlora railway.

j) Eighth five-year plan 1986-1990 coincides with the end the degradation and fall of communist regime. The economic situation continued to be in decline as most of heavy industries turned out to be unprofitable and the standard of living very low. During this period was aimed the reopening of relations with other countries (as Greece, Germany, France, Netherlands, Sweden, Canada etc.); import of new technology to modernize local production (although was felt the lack of qualified specialists) and balancing of export with import rate2[2].

The collapse of regime in 1991, and new elections of 1992, alienated the political and economic regime to the capitalist one. Although with many opportunities to enter in the world trade market, the Albanians were not ready for such opened roads. The country passed into chaos: informal economy, undisciplined privatization of shops and some warehouses (many of them were privatized not taking in consideration previous owners before the communist regime had taken to them), abandonment and violation of public properties and uncontrolled migration and emigration.

For some years, local economy started its first steps of stabilization which, however, fell down in 1997 with the collapse of pyramid schemes which had created a fraudulent financial system (inflation rate resulted 42% at the end of this year[3]). The years after the crisis followed by transformations in economy focusing in construction, agriculture, trade and financial sector; also, in large-scale privatization. Most of investors were interested in construction of new houses and trade-units, rather than dealing with other old structures. The years 2009-2010 created another slowdown of the economy, because of oversaturation with new buildings combined with global financial crisis. Subsequent years indicated slow economic growth which, however, is expected to change in the period 2016-2019. According to FDA, reforms should be implemented by increasing financial development, clarifying property right over land, improve law rules, make judiciary reform and increasing labors utilization (by reducing unemployment and stabilizing population migration)[4].

Combining the needs for economic escalation and stabilization of inner migration, the government is promoting several provisions as the approval of General Local Plans for all Albanian cities and definition of property ownership. Furthermore, the Ministry of Energy and Industry, has launched the document of "Strategic policy of non-food industry 2016-2025", aiming to revitalize forgotten or underused industrial sites.

2. METHODOLOGY

The aim for this study is to provide general suggestions of possible effective approaches regarding the regeneration of local Albanian underused industrial sites. Most of these industrial sites exist since the beginning of

[1] Institute of Marxist-Leninist Studies at the Central Committee of the PPSH, 'Main documents of the Party of Labor of Albania', Tirana, 1986, p. 59
[2] Valentina D., "History of Albania 912-200", Kristalina-KH, Tiranë, 2007, p. 307.
[3] The Bank of Albania, "Economy: Developments and Policies", Annual Report 1999, p. 3.
[4] International Monetary Fund, 'Albania. Selected Issues', Washington, D.C., 2016, p. 7.

communist period (1945-1990) and many changes have been done in the following years. For many years, after the fall of regime, these sites were dysfunctional, neglected and deteriorated. Only in the late year's specialist and politicians have come into common conclusions to start a general evaluation of possible regeneration means of these abandoned industrial sites. These former decommissioned industrial sites are now playing important role in city's structures and inhabitant's lives. It is important to start the path of professional project of underused sites redevelopment, taking in consideration the vast analysis of the last decades regarding these unguarded assets. This paper attempts to minimize the scientific literature and knowledge regarding the identification of these local assets in a large scale, increase awareness between young specialists, students and community with respect to brownfields and expands local and central level information regarding possible positive redevelopment and regeneration models that can be adopted in Albanian cases. The paper can be used as an initiation of future cooperations between local communities, NGOs, participants from government and specialists of relevant field to work together and be testimonials of city metamorphosis. Furthermore, international institutions, academics and specialist have the opportunity to be enlightened regarding these hidden assets, with interesting history and testimony.

For this paper were used several sources of information. Combined desk research work (historic and literature review) with several local Albanian on-site visits, have resulted in extended valuable information and have played a key role in the general outcomes. Many international authors have conducted a various range of research regarding regeneration, recuperation, adaption and protection of industrial archaeology [Tinder B., 2012; Clossley D., 1990, Stuart B. S., 2011; Yu Y., 2011]. International organizations as TICCIH, UNESCO, ICOMOS, EAHTR etc have concluded documentation and guidance of industrial patrimony and legislation about their protection and renovation conditions.

Regarding Albanian context, there are few authors who have been focused in local industrial heritage [Parandoni I., 2012, 2015; Menghini A. B., Calace F., 2015; Menghini A. B., Pashako F., 2014]. TRACULT Center is the only local organization which has worked regarding the documentation of Albanian industrial heritage. In 2005, was initiated the FoAP project to record all local archeological sites, however industrial sites are not counted as part of this heritage. In 2014, World Wide Fund for Nature conducted a study for the regeneration of industrial sites in Fier and Berat. However, it can be seen to have a large gap within local academics and specialist regarding the study of this national patrimony.

This study gives an added value in the field of industrial heritage, especially in the local context. It provides less known information regarding Albanian industrial heritage, updates status of the underused sites, proposes possible regeneration strategies of regeneration considering successful international cases. It can be viewed as a guide for local administration, NGOs, specialist of the fields, national and international stakeholders and even private owners of these facilities on possible regeneration methods and their affirmative impact in the urban, economic and social field. Possible flagship projects could be inspired, taking in consideration history, local conditions and future view for these assets, in order to achieve suitable transformations which also respect the collective memories of these sites.

Lastly, this study is an added value in the international level, providing documentation of underused industrial sites, evidence of local situations and an analysis of their historical transformations.

3. WORLDWIDE POSITIVE REGENERATION EXAMPLES

Industrial heritage is integral part of our cities and key places representing most symbolic elements of their time. Preservation and promotion of industrial heritage may pass through various paths as redevelopment, regeneration, adaptive reuse or conservation. Each of them provides sustainable operation of the heritage and increase of economic income. On the other hand, regeneration programs increase local identity, involving more people and raising awareness of their special values.

Worldwide industrial heritage regeneration programs are mostly implemented in the latest decades. They include the reuse of sites for tourism, museums, creative areas, cultural activities, residential, industrial and mix use. Some of the most successful case studies worthily mentioning are: Emscher Park in Ruhr (Germany), Waterfront regeneration Barcelona (Spain), Museum of Industry and Work of the Micheletti Foundation in Brescia (Italy), Gamlestadens Fabrıker Regeneratıon in Göteborg (Sweden), Vitkovice Ironworks in Ostrava (Czech Republic) etc.

3.1. Emscher Park in Ruhr (Germany)

Ruhr region is located in the western part of Germany, considered one of the largest urban areas in Germany. The district is rich of hydrological sources and known as the industrial valley. The early industrialization became at the 18th century with the textile and heavy industry. By 1850 in the region operated 300 coal mines, from which coal was exported worldwide[5]. The Ruhr area was the industrial region of coal mines, steel production, chemical, electrical, mechanical and engineering industries.

During the mid of 20th century, the industrial era was followed by closure of many factories. About thirty years later, the government started discussion on management and regeneration of the area (*Fig. 1, 2*). In this context, in 1989, was founded the Agency for the Ruhr Basin called "International Building Exhibition" (IBA). The regeneration process was driven by the idea of industrial heritage tourism, aiming '*economic boost, creating new jobs, revitalizing depressed areas, building new community, generate vibrant atmosphere, prompt innovation and creativity*'[6]. The Ruhr region is now the place of 'High-tech instead of blast furnaces, collieries as new venues for cultural events, party district instead of workers' pub[7].

Fig. 1. Smelting plant Westfalenhutte [Keil A., Wetternau B., 2013][8]

Fig. 2. Play points in old industrial structures, Emscher Park, Ruhr, Germany [photo by Latz M.][9]

5 Directorate-General for Internal Policies, Policy Department B: Structural and Cohesion Policies Transport and Tourism, 'Industrial Heritage and Agri/Rural Tourism in Europe. A review of their development, socio–economic systems and future policy issues', p. 58 (2013).
[6] Preite M., 'World Heritage, concepts and criteria'. Published at Industrial Heritage Re-tooled: The TICCIH guide to Industrial Heritage Conservation, ed. James Couet. Carnegie Publishing Ltd, Lancaster, UK, p.107 (2012).
[7] Colzolaio F., 'Industrial Heritage in the context of the other cultural heritages', Parliamentary Assembly Council of Europe Sub-committee on Culture, Diversity and Heritage (AS/Cult/CDH), Maribor, p.14 (2012).
[8] Keil A., Wetternau B., 'Metropolis Ruhr. A regional Study of the New Ruhr'. Edited by Regionalverband Ruhr, p.39 (2013).
[9] Latz + Partner., 'Project Landschaftspark Duisburg Nord'. Online: http://www.landezine.com/index.php/2011/08/post- industrial-landscape-architecture/23-play-points-mollerbunker/ (last visited on 10 August 2016).

The task intended to preserve and find new uses for the old industrial sites. Many old industrial structures (made of steel and concrete) and pipelines were turned into touristic attraction. On the other hand, various monuments were inventoried and converted into museums. Three types of industrial tourism attractions were created:

- Ex workhouses transformed into museums of industrial history or into spaces of art and exhibitions,
- Transformation of ex-transport facilities into visiting itineraries,
- Ex worker's and employer's dwellings used as part of touristic visits.

The district was also transformed in mixed use zones (i.e. Weststadt), residential quarters (i.e. Grugacaree), green belts (Krupp-Gürtel), educational functions (i.e. Grüne Mitte university neighborhood), creative industrial areas with mixed use (i.e. Scheidt'sche Hallen, Zeche Bonifacius and KU 28), sport facilities (the sports landscape in the Ruhr Metropolis).

In general, industrial heritage tourism in Ruhr was not only used as an economic tool but also an instrument to express the history of industry[10]. The Ruhr industrial tourism model has shown to be successful. Much of that success come from intensive and ongoing market research, market linked branding policies, excellent web sites, the combination of industrial heritage with creative activities (sport, theatres, shopping, events, parks) and a strong "can-do" mentality[11]. In the context of globalization and economic competition, the Ruhr motion has been 'think globally and act regionally'[12], in the sense of regional policies and actions to attain further sustainable economic development of the area.

3.2. Regeneration of Waterfront, Barcelona (Spain)

Barcelona is located in the north-east part of Spain, with direct access to Mediterranean Sea. During the '80, Barcelona experienced significant changes because of transformation from industrial to service and tourism facilities. Highlighting coastal line, remarkable beaches and maritime world, Barcelona has attracted tourist and investors from all over the world. The starting point of these transformations comes from 1986, when Barcelona got the opportunity to held Olympic Games in 1992. The developments for six years transformed city's view and urban structure representing a modern, aspirated and competitive city. The development plan was seen as a long-term instrument to create an improved city offering mix-use neighborhoods, better infrastructure, renewed public spaces and revitalized waterfront area. The idea was to create a polycentric city structure of 12 energizing points, which will emerge activities and revitalize the area. Part of the program was the transformation of industrial site of degraded waterfront into the home of Olympic Games. This strong marketing strategy was used to promote Barcelona in national and international level.

As the port facilities were moved away near the city center, the old port was the base of light and heavy industrial activities. In the mid of 1980, the city council approved the regeneration of this area by constructing new district of Nova Icaria and the location of Olympic Village[13]. The uniqueness of this plan was the intention to combine the past and the future in one area. The overall structure of the district should be as constructed by the plan of 1895, but buildings could be regenerated or redesigned by architects in contemporary language. The transport change structure proposed the conversion of Moll de la Fausta, one of the most occupied routes, into a promenade[14]; segregation of traffic by promoting public transport. The city has used one of its most potential elements to make possible urban renewal: the sea. The role of water is very important to increase life quality and emphasize local identity. As many other cities, Barcelona has combined the waterfront project with renewed public space (*Fig. 3, 4*). This creates uniqueness of place and makes possible intense competition in national level.

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[10] Ebert W., 'Industrial heritage tourism'. Published at Industrial Heritage Re-tooled: The TICCIH guide to Industrial Heritage Conservation, ed. James Couet. Carnegie Publishing Ltd, Lancaster UK (2012).
[11] Directorate-General for Internal Policies, Policy Department B: Structural and Cohesion Policies Transport and Tourism, 'Industrial Heritage and Agri/Rural Tourism in Europe. A review of their development, socio–economic systems and future policy issues', p. 60 (2013).
[12] Keil A., Wetternau B., 'Metropolis Ruhr. A regional Study of the New Ruhr'. Edited by Regionalverband Ruhr, p. 95 (2013).
[13] Idem. p.7.
[14] Routledge (2011) Transforming urban waterfronts. p.83.

Fig. 3. Poblenou old industrial building [https://commons.wikimedia.org/wiki/File:Poblenou_old_indus trial_building.jpg[15]

Fig. 4. Traditional landscape of Poblenou Neighborhood [http://www.oirealtor.com/blog/en/present/poblenou- neighborhood-recovers-its-industrial-heritage/][16]

3.3. Gamlestadens Fabrıker Regeneratıon, Göteborg (Sweeden)

Göteborg is one of the most important cities in Sweden, located on the western coast. Since the 17th century, when it was founded, Göteborg has served as a trading center for the Nordic area. The economy of the 18th-19th century was led by the East India Company coming to a significant industrial zone[17]. The city is well known for being home to international companies as Volvo, Astra Zeneca, Saab Ericsson Space, and Hasselblad[18] etc (*Fig. 5*). Following the footsteps of nowadays development, Göteborg is transforming heavy industries into knowledge enterprises as conferences, summits and self-promoting events. The shifting process towards logistic and knowledge economy has brought to life many revitalization projects, one of which is the upgrade of an ex-industrial site located

[15] Wikimedia, 'Poblenou old industrial building'. https://commons.wikimedia.org/wiki/File:Poblenou_old_industria l_building.jpg (last visited on 10 November 2016).
[16] BLOGOi Realtor, 'Poblenou Neighbourhood recovers its industrial heritage'. http://www.oirealtor.com/blog/en/present/poblenou- neighbourhood-recovers-its-industrial-heritage/ (last visited on 10 November 2016).
[17] EAHTR, 'Investing in Heritage. A guide to successful urban regeneration, p.44 (2007).
[1818] European 8, 'Book of sites. European Urbanity and Strategic Projects, p. 25 (2006).

in the northern part of the city. There are located some of the most important and oldest industrial buildings as ex-textile factories, power plant and workshops[19]; with a total industrial area of 62000 m². Developers are faced with some difficulties as the change of building use and the positioning of site in an important zone (*Fig. 6*). The solution should involve an adequate study of quality, its large dimensions and the integral participation of tenants.

Fig. 5. Gamlestaden Fabriker [ARKEOLOGISK FÖRUNDERSÖKNING. Göteborg 218, Nya Lödöse, Gamlestadens Fabriker. p.1, 2014]

Fig. 6. Gamlestadens Resecentrum - the future transport center [Platzer Fastigheter, year-end report. p.2., 1 January- 31 December 2014]

4. ALBANIAN CASE STUDIES

The intention of communist party to create a self-sustainable country was translated into the construction of many industrial sites. Major investments were made in heavy industry, with the assistance of foreign funds. The following describes some of the most representative industries of the time, most of which are now out of operation and in a difficult situation.

4.1. Metallurgical complex in Elbasan

Elbasan is located in central Albania and is one of the oldest cities in the country, also used as an important station of antique road intersection. With a rich cultural tradition, Elbasan's industrialization initiated during the beginning of the 20th century. A few factories of tobacco, oil, alcohol, and soap production were spread out at the time in all Albanian cities. However, the heavy industrialization agenda was proposed during the fourth 5-year plan (1966-1970), inspired by the visit of the Chinese leader Çu En Lai.

The heavy industrial site, transformed later in "black industry", is located about 2.5 km from the outskirts of the city. The funds from the Chinese Republic were utilized in 520 buildings where about 12000 people have worked for more than 20 years. In an area of about 460 km² are included: the mechanical factory, medium foliage factory, fine foliage factory, wire factory, steel lamination factory, TEC, factory 12 for production of agglomerates, furnaces, coke factory, nickel and cobalt factory, carbonaceous materials factory, refractory materials factory, ferro-chrome factory, sponge factory, remount and lime factory.

[19] EAHTR, 'Investing in Heritage. A guide to successful urban regeneration', p.50 (2007).

Nowadays, some parts of the site are being used by private companies for the production of ferro-chrome, steel, scrap, and some other products for bricks, limestone, or oxygen. However, a major part of the complex is not in use and lies in silence, in ruins (Fig. 7-9).

At the verge of approval of the National General Plan and General Local Plans of many Albanian cities, the Ministry of Energy and Industry has endorsed the Strategic Document of Policies for Non-food Industry, 2016-2025. The objective is to ensure a better management of ex-industrial objects by partial rehabilitation and transfer of their administration to private companies. Thereby, the value of these public assets will increase, and better management of the sites will be oriented in industrial manufacturing or other economically interesting services[20].

Fig. 7-9. Factories at the ex-Metallurgical Complex in Elbasan [photo by the author, 2016]

[20] Ministry of Energy and Industry, 'Strategic Document of Policies for Non-food Industry, 2016-2025'. p.39 (2016).

4.2. Industrial sites in Kuçova

Kuçova is located in central-south Albania, near the ancient city of Berat. It has been populated since the Illyrian period, and since the 17th century was known for the sale of crude oil to neighbors. For the first time, during the World War I, in Kuçoca were discovered oil fields by the Austrians. Soon, the use of these resources was managed by Italians, who invested in the infrastructure of drilling, extraction, and production of oil and its by- products. The Italian company, AIPA, later on AGIP, regenerated the whole city by constructing many industrial sites and auxiliary buildings. 1 million workers produced about 150000 tons per year up to the end of World War II. During the communist regime, Kuçova was known as the 'Stalin City', where there continued investments in the extraction of raw materials, energy, metallurgy, and textile mills.

Most of the industrial sites in Kuçova are located in the periphery, but closely attached to the city's outline. Some of the most important ones are the Mechanical Oil Plant, TEC, Enterprise for Oil Extraction, Oil Processing factories, Implant for natural gas purification and communal use, Factory of Oxygen, Firefighters, 'Stalin' Oil combine, Institute for Studies of Oil and Gas, Detergent Production factory, Laboratory for analysis of oil and gas and their quality Brick factories, Clay Production plant, Artisanal Processing enterprise, Army Aviation field and Aviation repair factory (Fig. 10-13).

Fig. 10-13. Industrial ruins in Kuçova [photo by the author, 2016]

General Local Plan of Kuçova (2016) envisages the reuse of deteriorated sites as logistic units, residential, cultural, and commercial spaces. Further feasibility studies should later specify the implementation possibilities and costs of these projects. Nevertheless, a clear vision and strategy for the city's regeneration will have a direct impact on social and economic life.

5. DISCUSSIONS

The centralized political organization of Albania's communist government had a deep social and economic impact. New industrial landscape, created in a very short time, changed radically cities' structures. Apart from the urge for progress, natural resources were exploited heedlessly. Furthermore, with the intention of spreading out economic development throughout the country, many processing industrial sites were constructed far from the raw material location. This fact leads to low productivity and overexploitation of natural assets. The situation further eroded with the depreciation of industrial sites after the change of regime, as a result of the destruction and degradation over time.

Cities' urbanization was another consequence of communist industrialization process. During 1950-1990 about 35 % of citizens were allocated in cities. These figures, increased further at these last decades, urbanizing more than 50 % of cities (Fig. 14). INSTAT (Albanian Institute of Statistics) foresees that in 2021, most of population will be concentrated in central Albania, with domination of the agglomerate Tirana-Durres[21].

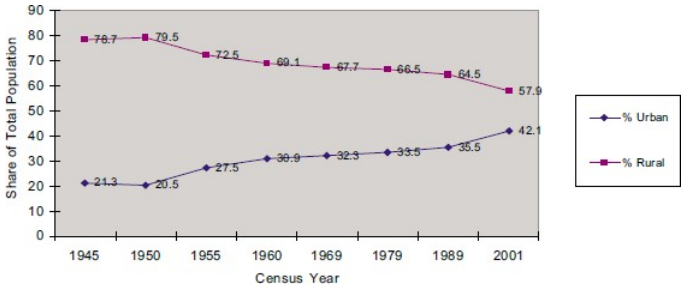

Fig. 14. Movements of urban and rural population, 1945-2001 [source: World Bank, 'Evaluation of Urban Secor in Albania', 2007, p. 5]

[21] INSTAT, 'Predictions for population of Albania 2001-2021', (2004).

Taking in consideration the changes of texture in Albanian cities, during these last decades, it is evident the need of initiative for regeneration project of these underused sites. In this context, being once the promotors of progress, redevelopment of underused industrial sites could now boost local economy, create new jobs, provide absent facilities and promote creative ideas. These sites are located in different part of each city, and their regeneration strategy will differ regarding national and local projection for these areas but also their value in the international level. The industrial site in Elbasan, is very distant from city and has been used for many years as an industrial site. Also, there are many companies which currently perform their work in this large area; hence the regeneration strategy could be more oriented in the economic view. The industrial site of Kuçova has been for years integral part of the city, some part of the sites are now destroyed and the other are not operative (TEC and Mechanical Offices). Regeneration strategies in this case should reflect the examples of Sweeden and Spain in order to propose combined usage of different areas.

Lastly, although being seen as "neglected" places, Albanian's underused industrial sites are also inseparable part of peoples' local memory and symbols of industrialization. They have once welcomed about 30000 workers/year, facing days of poverty and fatigue work, but also spirit of good cooperation. Hence, collective identity and sense of unicity that characterizes these places should carefully be interpolated with new urban regeneration proposals.

6. CONCLUSIONS

Albanian industrial heritage is part of international patrimony; hence it should be porometer and accurately protected. It is very interesting the large number of industrial sites constructed since the First World War but also the low number of this patrimony that could be found still untouched. Not only they are spread out through country, but some of nowadays new cities were constructed to serve industrial sites of the time. Some of them embody the large industrial movement of the time. Their presence towards the cities have changed through time, as the urban fabric itself has passed through various transformations. Intense urbanization, new economic structures and transportation facilities have integrated more the existing structures, which now act as important part of cities with good opportunities of urban revitalization. These decommissioned sites; which sometimes, because of deterioration of most of structures, are available unoccupied lands; have the possibilities to be better connected and accessible towards the city. In practice, General Local Plans of Albanian cities, distinguish these particular sites, which renewal will be topic of future studies as Detailed Local Plans. Further analysis should take in consideration the balanced combination through existing structures, which are important part of historical, cultural or natural elements; and new possible ones with various missing facilities.

Considering rapid urban changes in Albanian cities and fading up social and economic distortions, through these last decades, General Local Plans are now focusing on administering urban transformation with effective strategies. Although Law No. 9048 "On cultural heritage" (2003, still in force) does not include industrial sites as part of cultural heritage; brownfields are being seen as potential redevelopment sites and further PPP cooperation are expected to take place. Involvement of various actors into play, should produce proper urban transformations of these places. Furthermore, it is very important to take in consideration several worldwide positive approaches and consider their key points, viewport and essential elements which made them being successful. These reference points should be considered to be adapted and implemented in local Albanian cases, as their transformation into touristic attraction, museums, sport facilities, residential, educational and trading spaces or new industrial laboratories. These decisions should be double checked with the parameters of land use approved by Local General Plans and previsions of National General Plan of Albania. Additionally, appropriate site regeneration should consider adaptive reuse and conservation instruments for most representative existing buildings, which designate the character of place and the affiliation with each other.

Regarding the regeneration of the above-mentioned sites: Elbasan and Kuçova, it is important to consider the preconditions described by the Local General Plan for each of them. Part of the remaining factories in Elbasan, are nowadays privatized and used for industrial purposes. Most of the remaining buildings are decommissioned or not in good condition. The Albanian Government has proposed the rehabilitation and reuse of some parts of the site, as mini-industrial parks, which could be used by international investors. The area needs identification and clearance of industrial chemicals to achieve full operation of the objects after rehabilitation. It would be interesting to also propose some alternative facilities as a Museum of Memory of Hard Industry or Green Park, which would increase the value of the site. Being located at the crossroad of national itineraries, Elbasan could decentralize the tourism from the seaside and the capital city, using also it's ancient historical values and natural assets.

Kuçova, is located nearby the cities of Berat (part of UNESCO heritage) and Fier (mostly agricultural). Known as the 'petroleum city', Kuçova has now available a well-organized plan which provides redevelopment of most of

nowadays non-functional areas. The proposals of General Local Plan include the reuse of ex-UMN as industrial park, ex-TEC as cultural and commercial; and ex-UPN as mixed use one. Each of them is located at the outskirts of the old city, hence their regeneration will gradually improve the current tepid life.

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The Effectiveness of Sponsorship: Measuring Participants' Recognition of Sponsors' Brands in Athletics Races

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Abstract

Running is one of the most convenient forms of exercise, easily fitting into the daily routine of millions of people. The 5 km distance is the most common, with over 8.9 million participants recorded in 2018. Globally, corporate spending on sponsorship surpassed US$65 billion, with boosting brand visibility being a primary goal for sponsoring companies. However, much of the existing sponsorship research has not focused on participants' perspective, findings have been inconsistent, and the relationship between brand recognition and both real and fake sponsors has not been thoroughly examined. This study aimed to (i) measure how well runners recognize sponsor brands and (ii) compare recognition levels between real and fake sponsors at the Scalabis Night Race. A total of 736 runners from one of Portugal's most popular athletics events completed a questionnaire. Differences between runner groups were analyzed using the chi-square test. The findings revealed an average sponsor recognition rate of 76.5%. Real sponsors achieved higher recognition across all product categories compared with fake sponsors, and these differences were statistically significant. Overall, sponsorship linked to mass-participation athletics events proves to be a highly effective strategy for increasing sponsor brand awareness.

Keywords: athletics races, awareness, brand recognition, sponsorship effectiveness, sport events.

1. INTRODUCTION

Running is a widely practiced and easily accessible form of physical exercise. Recent reports show that the running sector remains dynamic, with 5 km being the most popular distance, with 3.4 million participants registered in 2024 (RunSignup, 2025). The main marathons are held mainly in Europe and the United States, with the London Marathon standing out as the world record holder for participants: in 2025, it reached around 60 000 finishers (London Marathon, 2025). The Budapest Marathon, meanwhile, saw a record 40 219 entrants from 119 countries (Marathon Budapest, 2025). Running occupies a central place in the public sphere and enjoys high visibility. In addition to the strong participation of runners, the economic values involved help explain the growing interest of companies in sponsoring athletics events.

Sponsorship is seen as a strategic decision to strengthen brand promotion and establish lasting relationships with consumers — in this case, runners. In 2025, global corporate investment in sponsorship exceeded $70.34 billion. (Business Research Company, 2025). In the context of athletics, TCS invests $40 million annually on marathon

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sponsorships, including London (Amraandelma, 2025). These figures highlight the strong attraction of sponsoring companies to this type of event. Preserving and increasing brand awareness is one of the main objectives of sponsorship (Grohs et al., 2004), as is influencing consumer attitudes and behaviour (Smolianov & Aiyeku, 2009). Awareness is the basis on which consumer responses to brands are structured. According to the Psychological Continuum Model, it is from this first level that deeper connections to running and associated brands develop (Funk & James, 2001). Consistently, awareness also represents the starting point for brand salience (Keller, 2008), allowing access to higher levels of brand connection, such as emotional and behavioural loyalty (Cornwell & Kwon, 2020).

Although it has been shown that there is a '...clear surplus of research on audience response to sponsorship-linked marketing...' (Cornwell & Kwon, 2020, p. 607), 1), some results remain contradictory. For example, in the context of recreational golf (Lee et al., 2011), it was found that frequency of participation is associated with greater sponsorship awareness; conversely, Silva (2016) in the context of judo did not identify significant differences between the level of practice and the rate of sponsor recognition. Furthermore, most studies on the effectiveness of sponsorship have been conducted through the lens of spectator-based sponsorship (Herrmann et al., 2016). Grassroots and niche sporting events do not have the same media exposure, and therefore it is necessary to consider the perspective of participant-based sponsorship (Koronios et al., 2022a; Koronios et al., 2022c), as is the case in our study.

Therefore, there are several research questions that need to be answered:

1) Do runners correctly recognise the brands of the Scalabis Night Race sponsors?

2) Do runners recognise the brands of the real Scalabis Night Race sponsors better than the brands of the fake sponsors?

The objective of this study was i) to determine the recognition rates of the sponsors' brands, and ii) to determine whether there are differences between the recognition rates of the real sponsors and the fake sponsors among runners in the Scalabis Night Race.

2. THEORETICAL BACKGROUND

Sponsorship corresponds to a payment in cash or in kind made to the owner of an activity (usually in the field of sport, art, entertainment or causes) in exchange for access to the exploitable commercial potential of that activity (IEG, 2017). Research on sports sponsorship globally has focused on the affective and behavioural outcomes of spectators (Eddy & Cork, 2019; Ko & Kim, 2014). However, in addition to these responses, brand awareness as a cognitive outcome has also been studied (e.g., Biscaia et al., 2013; Biscaia et al., 2014; Biscaia & Rocha, 2018; Eagleman & Krohn, 2012; Hickman, 2015; Lough et al., 2014; Rogic et al., 2019; Silva, 2016; Walsh et al., 2008; Zaharia et al., 2016), has been gaining interest, albeit in few studies and mainly from a perspective focused on participatory sport (Eddy & Cork, 2019; Koronios et al., 2022a; Koronios et al., 2022c). Based on the main line of research on sponsorship - which analyses its effects on consumers (Cornwell et al., 2005) - this study proposes a research question based on the idea that exposure to sponsors' communications tends to increase brand recognition levels.

2.1. Recognition of sponsoring brands

The level of consumer recognition is a relevant indicator of the likelihood that the message will generate meaning and increase brand awareness (Bennett et al., 2006). Awareness can be understood as "the ability of a consumer to recognise and recall a brand in different situations" (Aaker, 1996, p. 114). In the context of sponsorship, brand recognition refers to the consumer's ability to recall previous exposure to a sponsor when presented with a list of brands as an aid. This process represents an essential stage in communicating with consumers and reinforcing brand value; without this prior knowledge, other communication effects are unlikely to occur (Rogic et al., 2019). When an individual correctly identifies sponsors, this suggests a significant interest in the messages conveyed or in the event itself (Bennett et al., 2006). A set of factors was even observed that played a crucial role in improving sponsorship effectiveness, which generally begins with raising awareness of sponsorship and ultimately leads to increases in participants' intentions to purchase and recommend sponsors' products (Koronios et al., 2022a).

To better understand the effectiveness and level of consumer connection to sport, the Psychological Continuum Model (PCM), proposed by Funk & James (2001), identifies four levels of psychological involvement and response of participants or spectators to a sporting object — such as a race — organised along a continuum.

The first level, which underpins this study, corresponds to awareness or consciousness: in an initial phase, the individual learns, recognises and remembers certain sports, teams or brands, without yet showing any preference or attraction for them. At the opposite end of the continuum, and based on this awareness (Memon et al., 2016), is the level of loyalty, which translates into consistent consumption or participation behaviours associated with a sport or

brand. The assumption is that without brand recognition, sponsors will find it more difficult to achieve subsequent objectives, such as forming positive attitudes, increasing brand attraction or the intention to purchase their products. For this reason, it is widely accepted that raising awareness is an initial step — and a prerequisite — for sponsorship to yield additional benefits over time, as illustrated in Figure 1.

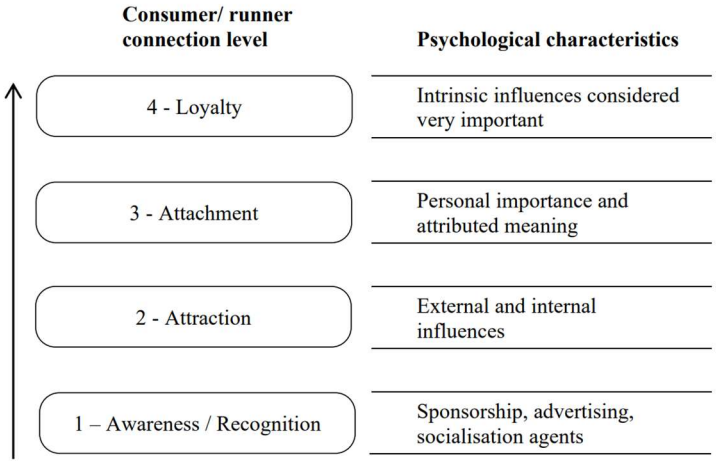

Fig. 1. The Psychological Continuum Model (PCM) – A conceptual framework for understanding an individual's psychological connection to sport / sport brand. Adapted from (Funk & James, 2001, p. 122)

Brand recognition can be understood in light of the so-called mere exposure effect. This phenomenon occurs when repeated – or even occasional – contact with a stimulus, even without full awareness, leads to the formation of a positive affective response to that stimulus (Bornstein & Craver-Lemley, 2022). Decades of research demonstrate the consistency and robustness of this effect in different contexts and levels of participant attention (Dos Santos, 2016). In line with this perspective, it is widely accepted that repeated exposure contributes to increasing the presence and relevance of a brand in the minds of consumers (Beaton et al., 2011).

Additionally, previous research indicates that factors such as market visibility, sponsorship duration (McDonald & Karg, 2015), beliefs about sponsorship (Koronios et al., 2022b) and the presence of multiple sponsors (Cornwell et al., 2005) influence how consumers respond to associated brands. It was found that, contrary to expectations, fan engagement with the activity did not positively influence sponsor awareness (Koronios et al., 2022b). However, these hypotheses have been little tested empirically in sporting events from the perspective of participants (Koronios et al., 2022a; Koronios et al., 2022c).

Although not always from the perspective of participatory sport (Eddy & Cork, 2019; Koronios et al., 2022a; Koronios et al., 2022c), numerous studies have sought to assess the visibility of sponsorship (e.g., Biscaia et al., 2013; Biscaia et al., 2014; Biscaia & Rocha, 2018; Hickman, 2015; Jensen & Vlacancich, 2023; Rogic et al., 2019; Silva, 2016; Walsh et al., 2008; Zaharia et al., 2016), including in the context of athletics races (Beaton et al., 2011; Eagleman & Krohn, 2012; Eddy & Cork, 2019; Lough et al., 2014). Previous research has shown that marathon runners recognised official sponsors including Zappos.com and others at relevant rates of 97.4%, 73.6% and 80.6% (Lough et al., 2014); At the Fayetteville Race Series event, sponsor recognition rates ranged from 82.5% to 5%, with higher rates for actual sponsors (Eddy & Cork, 2019). However, Biscaia & Rocha (2018) did not find entirely convergent results, finding that a greater number of respondents indicated the wrong brands when asked to name the mobile phone operator and yoghurt brand sponsoring the 2016 Rio Olympic Games, and for local sponsors, the recognition rate ranged from 54% to 28%. In turn, a longitudinal study conducted over 14 years on more than 500 sponsorships of North American sports leagues found an 8% increase in brand recognition in the first year after the start of sponsorship, but this is significantly reduced after the second year (Jensen & Vlacancich, 2023). Thus, based on the previous literature and the gaps that still remain, a research question (RQ) was posed about the ability of runners to correctly recognise the brands of the race sponsors, as shown in Figure 2.

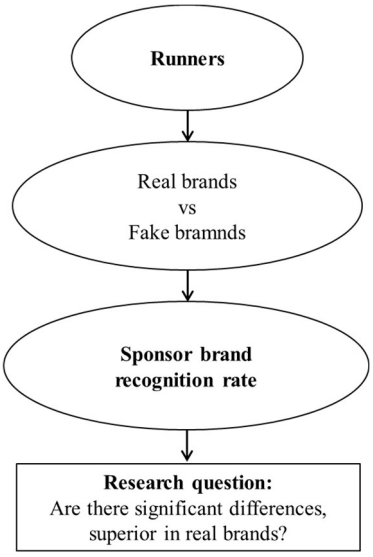

Fig. 2. Research question

The research question (RQ) is based on the idea that exposure to sponsors' communication stimuli leads to higher recognition rates for sponsors' brands:

RQ: Do runners recognise real sponsors better than fake sponsors of the Scalabis Night Race athletics event?

3. METHODOLOGY

3.1. Sample and procedures

The study adopted quantitative, cross-sectional and empirical design, using an associative strategy based on a comparative process (Ato et al., 2013). Participants were selected at a single moment among the runners of the "Scalabis Night Race" athletics event (https://scalabisnightrace.pt/), constituting a convenience sample. The choice of this race — held for over 15 years in the city of Santarém, Portugal, and consisting of two distances (10 km and 5 km) — was based on three main criteria: (1) the participation of runners with both recreational and competitive motivations; (2) the presence of several co-sponsors, facilitating the analysis and measurement of brand recognition; and (3) the high number of participants, over 4, 000, ensuring adequate conditions for obtaining the sample. The day after the race, a questionnaire with a link to an online response was sent to participants by email. The surveys were completed by the runners themselves after informed consent and remained available for two weeks. In total, 736 valid responses were obtained from 3 305 questionnaires sent, corresponding to a response rate of 18%. The system used ensured that only one response per IP address was recorded, preventing repeated participation.

Among the participants who responded to the questionnaire, 52.9% were male and 47.1% were female. The runners' ages ranged from 18 to 68 years old (M = 41.22, SD = 9.29), with most respondents falling into the 45-54 age group (27.2%), followed by 35-44 (42.0%), 25-34 (19.0%), 55-64 years old (7.8%), 18-24 years old (3.4%) and 65 years old and above (0.7%). Most runners were married (46.4%), followed by single participants (28.2%), cohabiting (16.2%), divorced (8.3%) and widowed (0.9%). In terms of education, the most common level among respondents was a bachelor's degree (41.6%), followed by secondary education (11th/12th grade) (35.6%), master's/doctorate (15.7%) and complete primary education (9th grade) (7.1%). The most common race distance covered by respondents was 10 km, 73.4% (n = 540), and 26.6% (n = 196) completed the 5 km race.

3.2. Instruments

For the translation and adaptation of the instrument from the original language into Portuguese, the methodological procedures recommended in the literature were followed (Vallerand, 1989). The measures used to assess sponsor brand recognition (SBR) as an indicator of brand awareness — were based on instruments used in previous studies

(Biscaia et al., 2014; Walsh et al., 2008), as shown in Table 1. Participants were asked to identify the official sponsors of the athletics race in order to assess their recall ability. Responses were scored from 0 to 10 based on the number of sponsors correctly recalled from a list of ten brands, including five real sponsors and five non-sponsors (fake).

Table 1. Definition and measurement of variables

Variable / items	Scale
Sponsor brand recognition (SBR) - Assisted awareness of sponsor name Regarding the sponsors of the Scalabis Night Race, indicate the brands/companies you recognise as sponsors. Mark those you recognise and those you do not recognise.	10 items: Adapted from (Biscaia et al., 2014; Walsh et al., 2008) List of 10 brands, five real and five fake.
Race distance (RD) In the Scalabis Night Race event, which race did you participate in? 5 km; 10 km	1 question Distance of the race
Gender, age, marital status, region, educational qualifications	

The race sponsors were five brands from the following economic sectors: automobiles, fuels, clothing retail, bakeries, and restaurants, see Table 2.

Table 2. Product category of sponsoring brands

Product category	Sponsor brand name
Cars	**Volkswagen**
	Peugeot
Fuel	**Repsol**
	Galp
Clothing shops	**WShopping**
	Centro Histórico
Bakeries	**Bijou**
	Panitejo
Restaurants	**Taberna Quinzena**
	A Grelha

Note: The brands marked in bold are the real sponsors of the Slababis Night Race.

3.3. Statistical analysis

The means and standard deviations of all variables analysed were calculated. Statistical analyses were performed using IBM SPSS Statistics software, version 26. To test the hypothesis of significant differences between the recognition of true and false sponsors, the Chi-square test was applied. Differences between means were considered statistically significant when the p-value was equal to or less than .050. The assumptions were verified using the Kolmogorov-Smirnov test with Lilliefors correction ($KS(736) = .167$, $p < .001$). The distribution of the variable in the sample was not normal. However, the violation of this assumption has no serious consequences because the sample size is large (n = 736), much greater than 40 (Myers & Well, 2003).

4. RESULTS

4.1. Sponsor recognition rates

Of the total of 10 brands presented to runners, of which only 5 were real sponsors of the race, the average brand recognition rate was 76.5% (total number of sponsor brands correctly identified). The average brand recognition error

rate was 46.1% (total number of sponsor brands incorrectly identified). Recognition rates ranged from 94.7% to 58.7%. All 5 brands of the true sponsors were recognised by 37.3% of runners, and more than half of the sponsor brands (3 out of 5) were recognised by 70.8% of runners. Only 1.1% of runners did not recognise any of the true sponsors of the race.

The fuel and automobile product categories were those in which the fake sponsors obtained the highest recognition rates, at a mere 13.0% and 3.9%, respectively, of the real sponsors, see Table 3. The sponsor brands with the highest recognition levels were WShopping (94.7%) and Taberna Quinzena (81.3%). The two sponsor brands with the lowest recognition levels were Repsol (67.3%) and Volkswagen (58.7%). All real sponsor brands achieved higher recognition rates than fake sponsors: Automobiles 58.7 vs 45.2; Fuel 67.3 vs 45.7; Clothing retailers 94.7 vs 45.4; Bakeries 80.6 vs 64.5; Restaurants 81.3 vs 68.5, as shown in Table 3.

Table 3. Recognition rates of sponsor brands

Product category	Sponsor brand	Correctly identified		Incorrectly identified	
		n	%	n	%
Cars	**Volkswagen**	432	58.7	304	41.3
	Peugeot	333	45.2	403	54.8
Fuel	**Repsol**	495	67.3	241	32.7
	Galp	336	45.7	400	54.3
Clothing shops	**WShopping**	697	94.7	39	5.3
	Centro histórico	334	45.4	402	54.6
Bakeries	**Bijou**	593	80.6	143	19.4
	Panitejo	475	64.5	261	35.5
Restaurants	**Taberna Quinzena**	598	81.3	138	18.8
	A Grelha	504	68.5	232	31.5

Notes: The brands marked in bold are real sponsors of the Slababis Night Race. The percentage value corresponds to the proportion of runners who correctly recognised the sponsor's brand. Runners could mark the brands they recognised as real and as fake.

4.2. Real and fake sponsors – RQ

The research question considered the attribute of true sponsor and its relationship with the recognition rate of the sponsoring brand. It established: RQ: Do runners recognise real sponsors better than fake sponsors of the Scalabis Night Race athletics race? Considering each of the five product categories, all true sponsor brands showed statistically significant differences compared to false brands in the same product category. Therefore, the results showed that it is possible to answer RQ affirmatively. In the product category, automobiles: Volkswagen brand (real) vs Peugeot brand (fake) ($\chi2 = 4.72$, df = 1, $p = .030$); In the product category, fuels: Repsol (real) vs Galp (fake) ($\chi2 = 56.10$, df = 1, $p < .000$); In the clothing retail product category: WShopping (true) vs Historic Centre (fake) ($\chi2 = 2355.68$, df = 1, $p < .000$); In the product category, bakeries: Bijou (real) vs Panitejo (fake) ($\chi2 = 959.01$, df = 1, $p < .000$); In the product category, restaurants: Taberna Quinzena (true) vs A Grelha (false) ($\chi2 = 1191.67$, df = 1, $p < .000$), see Table 4, which shows the observed frequencies, expected frequencies and residuals.

Table 4. Results of the Chi-square tests for each product category

Product category	Sponsor brand	Observed frequencies (n / %)	Expected frequencies	Residuals
Cars	**Volkswagen**	432 58.7%	403	-29
	Peugeot	403 54.8%	432	29
Fuel	**Repsol**	495 67.3%	399	-95
	Galp	400 54.3%	495	95
Clothing shops	**WShopping**	697 94.7%	402	- 295
	Centro histórico	402 54.6%	697	295
Bakeries	**Bijou**	593 80.6	261	-332
	Panitejo	261 35.5%	593	332
Restaurants	**Taberna Quinzena**	598 81.3%	232	-365
	A Grelha	232 31.5%	598	365

Notes: The brands marked in bold are real sponsors of the Scalabis Night Race.

5. DISCUSSION

5.1. Sponsor recognition rates

The objective of this study was i) to determine the recognition rates of sponsor brands, and ii) to determine whether there were differences between the recognition rates of real sponsors and fake sponsors among runners in the Scalabis Night Race.

The average recognition rate for sponsors was 76.5% (total number of sponsors correctly identified), and the recognition rate for real sponsors ranged from 94.7% to 58.7%. The values observed are considered to be in line with those found in other studies, three of which were in the field of athletics: 1) Marathon runners recognised the official sponsors, which included Zappos.com, GU and Brooks, with rates of 97.4%, 73.6% and 80.6% (Lough et al., 2014); 2). In "The Mag 7 Race Series," a wide variation was found among the eight sponsors, ranging from 80.7% to 11.4% (Eagleman & Krohn, 2012); and; 3) At the Fayetteville Race Series event, sponsor recognition rates ranged from 82.5% to 5%, with higher rates among true sponsors (Eddy & Cork, 2019). Outside the context of athletics, at the US State Games, a grassroots sporting event, a sponsor recognition rate ranging from 45% to 36% was observed (Miloch & Lambrecht, 2006), among nine NFL sponsors, the overall sponsor recognition rate was 80.2%, 74.0% to 30.1% (Hickman, 2015), and the recognition of the three judo sponsor brands in Portugal was 51.7% (Silva, 2016).

However, more than half of the sponsor brands (3 out of 5) were recognised by 70.8% of runners, and 96.7% of runners recognised at least one sponsor, figures well above those found by Silva (2016), in which 27.2% of judokas correctly recognised the three brands of actual judo sponsors (Silva, 2016) and 74.8% of runners recognised at least one sponsor (Eagleman & Krohn, 2012).

At the US State Games, a grassroots sporting event, 86% of subjects correctly recognised at least one sponsor and 35% recognised five or more sponsors. A relatively low rate was found by a panel of online participants, with a total of 38% of the sample recognising Sony as a sponsor of the 2010 FIFA World Cup (Mazodier & Quester, 2014). In the context of sports teams, 90.6% of respondents were able to accurately name the companies sponsoring sports teams, while 72.7% correctly recognised the sponsors of individual athletes (Rogic et al., 2019).

The average error rate for recognising sponsor brands was 46.1% (total number of incorrectly identified sponsors). More than half of the runners, 54.8%, incorrectly mentioned a sponsor called "Peugeot", a result similar to that obtained by Biscaia et al. (2014), who found that 51.2% incorrectly mentioned a bank that was not a real sponsor of the sports team (Biscaia et al., 2014). We also found that 1.1% of runners did not recognise any of the real sponsors, while in the case of judo athletes, 25.2% did not recognise any brand as a sponsor (Silva, 2016).

The recognition rate of sponsors is influenced by many factors that must be considered. Brand familiarity and pre-existing brand awareness have positive effects, so, as recognised in previous research (McAlister et al., 2012),

effective brand leverage and activation result in greater awareness of sponsor brands. In the absence of pre-event awareness measures, these results should be treated with caution because, as researchers have pointed out in various contexts, sponsor brand awareness is highly variable, which, by extension, has an impact on the reliability of measuring the success of a sponsorship investment (Miloch & Lambrecht, 2006).

5.2. Real and fake sponsors – RQ

The research question in this study considered the condition of real and fake sponsors and their relationship with sponsorship brand recognition. The RQ was based on the idea that runners have a higher recognition rate of real race sponsors than of fake sponsors. The result obtained allowed us to answer RQ affirmatively, insofar as it was effectively the brands of real sponsors, in all product categories, that showed higher recognition rates when compared to the recognition rates of fake sponsors, these differences being statistically significant.

A potential explanation for the results can be supported by the phenomenon expressed by the mere exposure effect (Bornstein & Craver-Lemley, 2022). The mere exposure effect occurs when repeated or single exposure to a stimulus, even in the absence of awareness, results in the formation of a positive affective reaction to the stimulus. The results of decades of research have demonstrated the robustness of the mere exposure effect across a variety of stimulus domains and levels of individual notoriety (Dos Santos, 2016). Consistent with this idea, it is generally accepted that repeated exposure is important for increasing the relevance of a particular brand in consumers' minds (Beaton et al., 2011). On the other hand, the literature also suggests that consumers' ability to identify a sponsor increases with the duration of exposure (Biscaia et al., 2014; Walliser, 2003). In the case of the athletics race, runners were exposed to the actual sponsors of the race on repeated occasions throughout the course of the race. This increased exposure and a willingness to process information from the contextual environment of the race (exposure to brand cars, posters and sponsor flags along the race route) may have led to higher recognition rates for the brands of the actual sponsors.

Thus, as would be natural, the recognition rates verified showed that official (true) sponsors received a higher level of notoriety than non-sponsoring brands, results that converge with those found by several studies in the context of athletics (Eddy & Cork, 2019; Lough et al., 2014). However, Biscaia & Rocha (2018) did not find entirely convergent results, finding that a greater number of respondents indicated the wrong brands when asked to name a mobile phone operator brand and the yoghurt brand sponsoring the 2016 Rio Olympic Games. Nevertheless, most respondents recognised the correct beer brand that sponsored the event. Contrary to the above results, in our study, it is possible to state that it was worthwhile for a brand to sponsor the athletics race because it achieved significantly higher levels of awareness than non-sponsoring brands.

Our results seem to confirm the findings obtained from more than 500 sponsorships of North American sports leagues in a 14-year longitudinal study, which found an 8% increase in brand recognition in the first year after the start of sponsorship, but a significantly reduced value after the second year (Jensen & Vlacancich, 2023). These results seem to contradict the prevailing assumption that sponsorship investments must necessarily be long-term, suggesting that the effects on brand awareness are more immediate and that effectiveness decreases the longer a brand remains a sponsor (Jensen & Vlacancich, 2023). Therefore, sponsorship of an athletics race will still have greater value from the point of view of mass participation, making an important contribution to sports management.

6. CONCLUSIONS

This study sought to analyse the recognition rates of sponsoring brands and, in particular, to verify whether there are differences between the recognition of real sponsors and fake sponsors. As discussed earlier, some evidence suggests that sponsorship associated with sports participation (Eddy & Cork, 2019; Koronios et al., 2022a; Koronios et al., 2022c) may have an effect on sponsorship outcomes.

Given that research on sponsor awareness in the context of athletics (Beaton et al., 2011; Eagleman & Krohn, 2012; Eddy & Cork, 2019; Lough et al., 2014), this research contributes to the sports marketing literature by assessing this dimension and deepening the understanding of the differences between real and fake sponsors. Overall, the results indicate that sponsorship in athletics races is an effective strategy for enhancing brand awareness, with consistently higher recognition rates for real sponsors.

The study also has relevant implications for practice, especially for race organisers and sponsoring companies considering integrating sponsorship of these events into their marketing communication mix with the aim of increasing brand awareness.

For organisers, it is recommended to support sponsors whose brands have lower levels of awareness through the joint implementation of activation actions. These may include distributing gifts to reinforce brand recognition, creating

sponsored areas near the starting line that allow the public and runners to watch prominent athletes warm up, or installing sponsored interactive cameras (Kiss Cam) that capture fun moments for display on giant screens, promoting immediate entertainment.

From the point of view of sponsoring companies, a first consideration is the difficulty in generating higher levels of awareness among runners, which represents not only a missed opportunity, but also the need to reinforce activation strategies that increase interest in brands and provide positive experiences for participants. Secondly, it is suggested that programmes be designed that integrate various promotional initiatives at the race venue, such as free product trials, raffles or hospitality areas where runners can rest and interact. Thirdly, investing in sponsorship without impacting brand value loses its strategic meaning; therefore, it is essential to strengthen relationships with runners and prioritise long-term partnerships that contribute to the legitimacy and reputation of brands.

Finally, considering that during the race, participants' attention tends to focus on the course and other runners, the visual presence of sponsors along the route is particularly important. Placing posters, flags and advertising banners, as well as including logos on official shirts, is an effective way to increase brand exposure and recognition.

This research has some limitations and, at the same time, points to avenues for future studies. Firstly, the study focused only on one athletics race and its sponsors, which may limit the generalisation of the results to other sporting events or organisations. Secondly, future research could use more diverse samples, involving runners from different events, in order to deepen understanding of the awareness of sponsoring brands in the context of races.

As in most studies in this area (Cornwell & Kwon, 2020), no prior measurement of brand exposure was made, which may lead to an overestimation of the contribution of sponsorship to marketing objectives. Previous research indicates that long-term sponsorship agreements tend to benefit brands even after they have ended (Biscaia et al., 2014). Thus, conducting longitudinal studies across different editions of the same race could contribute to a deeper understanding of the visibility of sponsorship among runners.

Thirdly, it has already been demonstrated that variables such as loyalty and involvement with the sport influence sponsorship results (Bachleda et al., 2016; Beaton et al., 2011). In this sense, it would be pertinent to analyse the degree of loyalty to the race and the level of involvement of the participants, as well as to assess the impact of these factors on the effectiveness of sponsorship actions. Fourthly, although the focus of this study was brand recognition, assessing the effectiveness of sponsorship requires a more comprehensive analysis. It is known that consumers go through several stages, from brand awareness to the purchase decision; thus, future research could explore the relationship between brand awareness, attitudes towards the sponsor, purchase intentions (Silva & Veríssimo, 2020; Speed & Thompson, 2000) and actual sales (Zaharia et al., 2016), allowing for a better understanding of the benefits that companies derive from sponsoring athletics races.

Finally, there is evidence that the effective implementation of sponsorship programmes can positively influence organisational culture and motivate employees (Chadwick & Thwaites, 2004). From the perspective of promoting healthy lifestyles, it would be interesting to analyse the role of sponsorship as an incentive for employees of sponsoring companies to adopt more active behaviours.

The results obtained allow us to highlight a central conclusion: sponsorship of athletics races, especially in contexts of mass participation, proves to be a highly effective tool for increasing brand recognition and, consequently, reinforcing its value from the consumer's perspective.

Finally, one of the most relevant benefits for companies lies in the possibility of associating themselves with an activity that is part of the runners' identity. Sponsorship creates opportunities for emotional connection with participants by sharing and reinforcing a common passion for running.

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