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Wine Tourism as a Place-Based Strategy for Value Creation and Regional Development

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Abstract

This study aims to analyse how wine tourism contributes to economic, social, and environmental outcomes at both the winery and regional levels, and to examine its strategic role within an emerging wine tourism destination. A qualitative case study approach was adopted, and data were collected through an in-depth semi-structured interview with the winery's senior management, direct observation, and documentary analysis, following a triple bottom line perspective to capture multidimensional impacts. The findings show that wine tourism does not function as a primary revenue source but plays a strategically significant role by enhancing financial stability, brand positioning, and market access, while at the regional level, it generates spillover effects through employment creation, cooperation with local actors, and destination branding. Socially, it contributes to cultural valorisation and learning opportunities, although deeper community embeddedness depends on education and long-term institutional commitment. Environmentally, it reinforces resource efficiency and landscape preservation but increases pressure on fragile ecosystems in the absence of coordinated territorial governance. This research presents empirical evidence from Mexico, an underexplored context in wine tourism research, advances understanding of wine tourism as a relational and place-based mechanism linking firm strategy with regional sustainability outcomes, and provides relevant theoretical, managerial, and policy implications for wine tourism and regional development, offering insights on how to integrate wine tourism into sustainable regional development strategies.

Key words

wine tourism, corporate performance, regional development, sustainability, triple bottom line.

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Introduction

The global wine industry has undergone profound transformations over recent decades, driven by changes in production technologies and consumption patterns, as well as by a growing integration of wine with broader experiential, cultural, and territorial dynamics (Alebaki et al., 2022; Jovanović et al., 2025; Frasnetti et al., 2024; Sthapit et al., 2024). Traditionally understood as an agri-food sector focused on the cultivation of grapes and the production and commercialisation of wine, the industry has increasingly embraced a multifunctional perspective in which wine is embedded within tourism, gastronomy, culture, and context-based experiences. In this environment, wine tourism has emerged as a strategic activity that allows wineries and regions to diversify income sources, strengthen brand identity, and foster closer relationships with consumers, which has potential economic, social, and environmental impacts at the local and regional levels (Bole, 2024; da Silva Flores et al., 2024; Spiga & Cardebat, 2024; Turčinović et al., 2025). In this sense, wine tourism has become a key component of rural development strategies, particularly in wine-producing regions seeking to enhance their competitiveness in increasingly saturated and globalised markets (Pearson et al., 2024; van Leeuwen et al., 2024; Hewidy & Eräranta, 2025). At the international level, this activity has consolidated as a mature and structured sector in traditional Old World wine regions, especially in Europe, and has rapidly expanded its influence to New World wine-producing countries, with particular relevance in the United States, Australia, Chile, Argentina, South Africa, and New Zealand, demonstrating that wine tourism can function as a catalyst for territorial development by stimulating local employment, encouraging entrepreneurship, supporting the preservation of cultural heritage, and promoting sustainable land-use practices (Deng et al., 2024; Lei et al., 2024; Kladou et al., 2025). The global diffusion of wine tourism has also been facilitated by changes in consumer behaviour, with tourists increasingly seeking authentic, place-based experiences that combine leisure, learning, and emotional engagement; as a result, wineries have progressively repositioned themselves as experiential spaces rather than solely production units, integrating tasting rooms, guided tours, restaurants, accommodation, cultural events, and educational activities into their business models (Pearson et al., 2024; Sáenz-Navajas et al., 2024; Tasci et al., 2024; Zhan & Shi, 2024; Carchano et al., 2025). Within this global panorama, Mexico represents an interesting and underexplored context for the study of wine tourism since, although Mexico is not traditionally classified among the world's major wine producers, its wine sector has experienced significant growth and professionalisation in recent decades, and its production is characterised by a strong regional concentration, with a predominance of small and medium-sized wineries, and a close linkage between wine, gastronomy, and tourism. This makes the Mexican wine sector especially suitable for the development of wine tourism as a complementary activity capable of enhancing both winery performance and regional development outcomes. The Mexican wine industry has evolved significantly since its early historical origins, moving from a marginal and fragmented activity to a dynamic sector with increasing national and international recognition, and today wine production is largely concentrated in a limited number of regions, among which Baja California stands out as the most prominent and consolidated wine-producing area.

Other emerging regions, such as Querétaro, Coahuila, Guanajuato, and Zacatecas, have also begun to develop wine tourism initiatives, although on a smaller scale, fostering the growth of domestic wine consumption, the rise of culinary tourism, and the increasing interest of both national and international visitors in Mexican wine culture, creating favourable conditions for the expansion of wine tourism across the country. In this regard, Baja California, and more specifically the Valle de Guadalupe and its surrounding areas, occupies a central position in the Mexican wine context, accounting for the majority of national wine production and considered the epicentre of wine tourism in Mexico. It is characterised by a geographical proximity to the United States, a favourable climate, a particular terroir, and a strong gastronomic ecosystem, which have contributed to its rapid development as a wine tourism destination over the past two decades, and it has witnessed an increase in the number of wineries, tourism infrastructure, and complementary services over time,

transforming the region into a reference point for experiential tourism in Mexico. Within this regional context, wineries have increasingly adopted wine tourism as a strategy to develop their business activity, integrating production, hospitality, culture, and sustainability-oriented practices. Among the wineries operating in Baja California, Winery Magoni, located near Ensenada, offers a particularly illustrative case of how wine tourism can generate multidimensional impacts at both the firm and regional levels. Winery Magoni combines wine production with tourism activities that emphasise experiential design, architectural integration with the landscape, and a strong connection to local identity. Its location in Baja California, the most developed wine tourism region in the country, provides an ideal setting to analyse the economic, social, and environmental effects of wine tourism within a developing wine economy. The topic of wine tourism has attracted increasing attention from scholars across disciplines, including tourism studies, regional economics, management, and sustainability. From a theoretical perspective, it is a field that can be understood as a hybrid activity situated at the intersection of agriculture, tourism, and cultural industries, aligning closely with theories of endogenous regional development, which emphasise the mobilisation of local resources, knowledge, and identity to generate sustainable growth, as well as the experience economy framework, which highlights the shift from product-centred to experience-centred value creation, and with stakeholder theory, given the multiple actors involved, including wineries, tourists, local communities, public institutions, and environmental organisations (Sun & Drakeman, 2022; Pearson et al., 2024; Sánchez-García et al., 2024). The importance of wine tourism for regions can be analyzed through economic, social, and environmental dimensions. Economically, wine tourism can contribute to revenue diversification for wineries, reduce dependence on volatile wine markets, and enhance direct-to-consumer sales, often with higher margins, while at the regional level, it stimulates local economies by creating employment, supporting small businesses, and encouraging investment in infrastructure and services (Amaral et al., 2024; Jannes & Barreal, 2024; Mora et al., 2025).

Socially, wine tourism fosters cultural exchange, reinforces regional identity, contributes to the preservation and valorisation of local traditions, gastronomy, and heritage, and facilitates stronger connections between producers and consumers, enhancing trust, knowledge transfer, and social capital (Lazăr & Pnake, 2024; Martins et al., 2025). Environmentally, wine tourism can incentivise sustainable practices by increasing awareness of landscape preservation, promoting responsible resource management, and aligning winery strategies with environmental management, particularly when sustainability becomes part of the tourism narrative and visitor experience (Martínez-Falcó et al., 2024; Sorcaru et al., 2024; Vecchio et al., 2024). Despite its growing relevance, the empirical analysis of wine tourism in emerging wine regions remains limited, particularly in the Mexican context, and existing studies have predominantly focused on well-established wine destinations in Europe or the New World, leaving a gap in understanding how wine tourism functions in regions where the sector is still consolidating and where institutional, social, and environmental dynamics may differ significantly (Crick & Crick, 2024; Lei et al., 2024; Depetris-Chauvin, 2025). Moreover, there is a need for in-depth qualitative research that captures the complexity of wine tourism impacts beyond aggregate indicators, incorporating wineries' perspectives and their interactions with the surrounding territory. The main objective of this research paper is to analyse the economic, social, and environmental impacts of wine tourism activities at both the winery and regional levels.

Methodologically, this study adopts a qualitative case study approach, which is suitable for exploring complex phenomena embedded in specific contexts (Sthapit et al., 2024; Turčinović et al., 2025). In particular, an in-depth analysis of Winery Magoni and its wine tourism activities is conducted, drawing on several sources of evidence, including a semi-structured interview, direct observation, and secondary documentation, seeking to understand how wine tourism contributes to the strategic development of the winery, how it interacts with the local community and regional ecosystem, and how it shapes sustainability-oriented outcomes in the Ensenada region, a leading Mexican wine tourism destination. This approach allows for a rich and contextualised understanding of the processes through which wine tourism generates value and impacts across different

dimensions, and facilitates analytical generalisation, enabling the extraction of theoretical insights that may be relevant to other wineries and regions with similar characteristics. The results of the study indicate that wine tourism plays a central role in enhancing the economic resilience of Winery Magoni by diversifying income streams, strengthening brand positioning, and fostering direct relationships with consumers, while at the regional level, it contributes to local economic development through employment creation, collaboration with local suppliers, and the attraction of visitors with high spending potential.

In social terms, the findings highlight the role of wine tourism in reinforcing regional identity, promoting cultural exchange, and generating positive spillovers for the local community, while environmentally, this investigation provides evidence about how wine tourism can support sustainability objectives by encouraging landscape conservation, responsible resource use, and environmental awareness among visitors, although it also underscores the need for careful management to mitigate potential negative impacts associated with increased tourist flows. From a theoretical perspective, the study contributes to the literature on wine tourism and regional development by providing empirical evidence from an emerging wine region and by integrating economic, social, and environmental dimensions within a single analytical framework, and reinforces the view of wine tourism as a strategic activity that extends beyond traditional tourism metrics and highlights its relevance for sustainability-oriented regional development. In managerial terms, the findings offer practical insights for winery owners and managers regarding the strategic design of wine tourism experiences, the integration of sustainability into tourism offerings, and the importance of collaboration with local stakeholders, while from a policy perspective, the study provides evidence to support the development of specific public policies aimed at fostering sustainable wine tourism, improving infrastructure, and enhancing coordination among public and private actors. The structure of the research is shown in Figure 1.

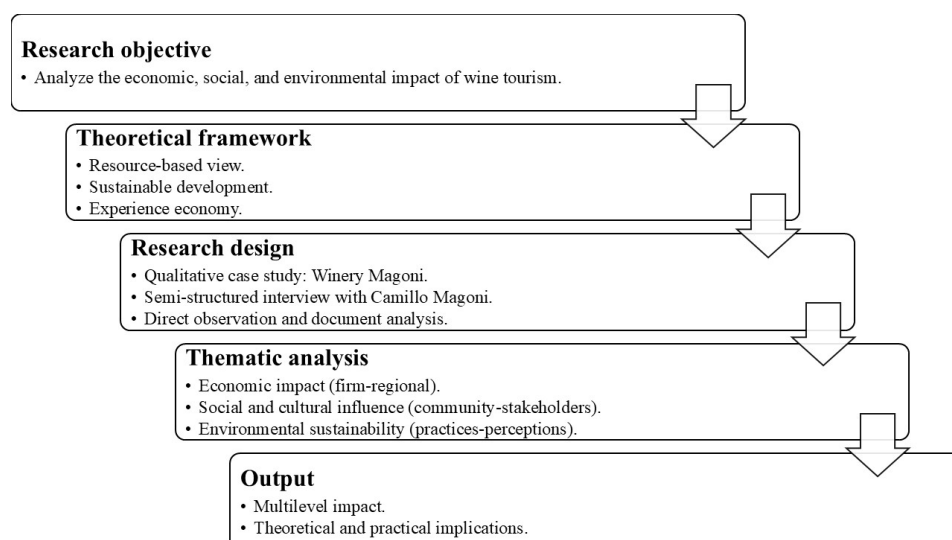


Figure 1. Research design and analytical approach.

Source: Own elaboration.

1. Literature review

1.1 Value creation through wine tourism

Wine tourism has progressively been conceptualized as a strategic mechanism through which wineries extend their value creation processes beyond the core activity of wine production, and wineries engaged in wine tourism tend to adopt hybrid business models that integrate production, services, culture, and place-based experiences (Pearson et al., 2024; Depetris-Chauvin, 2025; Rašan et al., 2026). From this perspective, value creation emerges from the sale of wine as a product and from the symbolic, relational, and experiential dimensions associated with visiting the winery and engaging with its territory (Sánchez-García et al., 2024; Wu et al., 2024). Wine tourism allows firms to

internalise downstream activities, strengthen direct relationships with consumers, appropriate higher margins, and reduce dependence on traditional distribution channels (Brito et al., 2024; Dias et al., 2024; Constantin et al., 2025). The resource-based view provides a theoretical basis to understand how wine tourism contributes to firm-level value creation and, according to this perspective, competitive advantage arises from the effective deployment of valuable, rare, inimitable, and non-substitutable resources (Monson, 2024; Spiga & Cardebat, 2024; Ferreira & Ferreira, 2025; Malhotra et al., 2025). In the wine sector, these resources are deeply embedded in territory and include terroir, landscape, heritage, architectural design, and tacit knowledge, and enable wineries to mobilize and recombine these resources in ways that are difficult for competitors to replicate, transforming them into experiential assets that enhance perceived value, e.g., through guided tours, tastings, and storytelling, wineries convert intangible attributes into market-relevant capabilities that support differentiation strategies (del Pilar Leal et al., 2024; Downing & Barney, 2024; Cobbinah et al., 2025).

Beyond firm boundaries, value creation through wine tourism also operates at the regional level, and wineries act as drivers of value within broader local systems, generating spillover effects for hospitality providers, restaurants, artisans, and other complementary activities, stimulating network-based value creation, where multiple actors jointly contribute to and benefit from the attractiveness of the destination, reinforcing regional branding, and contributing to the emergence of wine territories as coherent tourism ecosystems rather than fragmented offerings (Lei et al., 2024; Jovanović et al., 2025; Rašan et al., 2026). However, wine tourism is not limited to economic outcomes, and scholars increasingly stress that the process is multidimensional, encompassing social and environmental dimensions that reinforce long-term viability, since by fostering closer interactions between producers, visitors, and local communities, wine tourism enhances relational value and trust, which are essential for sustaining competitiveness over time (Amaral et al., 2024; Vecchio et al., 2024; Johnson & Buhalis, 2025). In this sense, wine tourism operates as a platform through which wineries align economic objectives with broader territorial development goals, creating shared value that transcends transactional exchanges.

1.2 Place-based social dynamics of wine tourism

Wine tourism is inherently place-based, as it is grounded in specific geographical, cultural, and social contexts that shape both the supply of experiences and their perceived authenticity, since the social dynamics that emerge from wine tourism are deeply intertwined with local communities, traditions, and forms of collective identity, reconfiguring social relationships by bringing together producers, residents, visitors, and institutions within shared spaces of interaction, thus playing a central role in determining the sustainability and legitimacy of wine tourism development (da Silva Flores et al., 2024; Lazăr & Pnake, 2024; Vieira et al., 2025). Stakeholder theory offers a robust framework to analyse the social dimension of wine tourism, since it emphasizes that organizational activities generate impacts for multiple stakeholder groups, whose interests and expectations must be recognized and balanced, e.g., in the context of wine tourism, wineries interact with tourists, local residents, employees, suppliers, public authorities, and civil society organizations, so that when wine tourism strategies are aligned with stakeholder interests, they contribute to social cohesion, mutual trust, and community support, which are critical for long-term success (Cao et al., 2024; Piras & Pedes, 2025; Back et al., 2025).

Social value creation through wine tourism supports local employment and skills development, particularly in rural or semi-rural areas where alternative opportunities may be limited, contributes to the preservation and revitalization of local culture by valorising traditions, gastronomy, and narratives associated with wine production, and fosters social capital by encouraging collaboration among wineries and between wineries and other local actors, leading to coordinated initiatives such as routes, festivals, and collective branding efforts (Gu et al., 2024; Jannes & Barreal, 2024; Lazăr & Pnake, 2024; Spiga & Cardebat, 2024). However, social outcomes are contingent on governance and inclusiveness, since wine tourism can generate tensions related to land use, access to resources, or cultural commodification if local communities are marginalised from decision-making processes

(Monson, 2024; Wang et al., 2024). In this regard, stakeholder-oriented approaches help mitigate these risks by promoting dialogue, transparency, and shared responsibility, so that wine tourism becomes a socially embedded activity that reinforces place identity and collective well-being, provided that social dynamics are actively managed rather than assumed to evolve spontaneously (Back et al., 2025; Piras & Pedes, 2025).

1.3 Tourism, resources, and competitive dynamics in the wine sector

The competitive dynamics of the wine sector have increasingly shifted from product-based competition toward competition among destinations and integrated offerings, and as global wine markets become more saturated and standardised, wineries seek alternative sources of differentiation that are less vulnerable to price competition (Brito et al., 2024; Back et al., 2025; Constantin et al., 2025). In this context, tourism emerges as a strategic domain in which resources embedded in territory and organisation are transformed into competitive advantages that extend beyond the bottle, so that wine tourism can reshape competitive logic by repositioning wineries within broader destination systems. From an endogenous development perspective, regional competitiveness is driven by the ability of local actors to mobilize internal resources and capabilities, and wine tourism exemplifies this logic by leveraging natural landscapes, historical trajectories, and accumulated knowledge as foundations for tourism development, which are context-specific and path-dependent resources that limit imitation and reinforce the uniqueness of wine regions, fostering the coherence and authenticity of the regional offer (Crick & Crick, 2024; Martínez-Falcó et al., 2024).

Tourism-related competitiveness in the wine sector is also relational in nature, inasmuch as wineries compete and cooperate simultaneously within regional networks, engaging in dynamics that enhance destination attractiveness (Gao et al., 2024). Collective action among wineries and tourism stakeholders strengthens bargaining power, visibility, and resilience, particularly in emerging wine regions, reducing individual vulnerability to market fluctuations and enabling knowledge sharing and innovation (Sáenz-Navajas et al., 2024; Cobbinah et al., 2025). Moreover, the integration of tourism into competitive strategies alters resource allocation and strategic priorities within wineries, while investments in visitor facilities, human resources, and service quality become central to maintaining competitiveness, contributing to build long-term advantages by helping to position the winery within the destination's competitive structure, thus serving as a strategic domain through which wineries and regions jointly construct sustainable competitive positions (Alessandri et al., 2024; Pearson et al., 2024; Turčinović et al., 2025).

1.4 Experiential tourism as a source of value creation

Experiential tourism has become a dominant paradigm in contemporary tourism research, emphasizing the role of emotions, engagement, and meaning in shaping visitor satisfaction and value perceptions, and within the wine sector, it reframes wine consumption as an immersive process that connects sensory experiences with narratives of place, people, and production, being central to the attractiveness and differentiation of wine tourism destinations (Gao et al., 2024; Wang et al., 2024; Zhan & Shi, 2024). In this respect, the experience economy framework argues that economic value increasingly derives from staged experiences that engage consumers on emotional, intellectual, and sensory levels, so that experiences such as tastings, vineyard walks, and interactions with winemakers transform wine from a commodity into memorable encounters, deepening consumer attachment, enhancing willingness to pay, and fostering long-term loyalty (Sorcaru et al., 2024; Sthapit et al., 2024). Experiential value creation also operates through learning and participation, since wine tourists often seek knowledge about production processes, terroir, and sustainability practices, positioning wineries as educational spaces, and this learning dimension can enhance perceived authenticity and reinforce the symbolic value of wine, through participatory experiences which may be effective in generating lasting impressions and positive word-of-mouth (Gao et al., 2024; Sorcaru et al., 2024). Furthermore, experiential tourism contributes to value creation by integrating environmental and cultural elements into the visitor experience, inasmuch as landscapes, architecture, and sustainable practices become part of the narrative conveyed to tourists, aligning

experiential enjoyment with environmental awareness, supporting managerial objectives and broader sustainability goals by shaping visitor attitudes and expectations (Nave et al., 2021; del Pilar Leal et al., 2024; Wu et al., 2024).

The proposition that wine tourism positively contributes to the triple bottom line integrates insights from the economic, social, and environmental dimensions discussed in prior sections and, in this respect, it functions as a value creation mechanism that aligns firm-level strategies with regional development outcomes (Amaral et al., 2024; Piras & Pedes, 2025). Wine tourism can enhance revenue diversification, strengthen market positioning, stabilize cash flows for wineries, generate spillover effects that benefit local economies through employment, entrepreneurship, and destination attractiveness, foster stakeholder engagement, reinforce place identity, contribute to social cohesion when governance structures are inclusive and participatory, strengthen social capital and legitimize the wine sector within its territorial context by creating spaces of interaction among producers, visitors, and communities, sustaining tourism growth and mitigating potential conflicts associated with increased visitation (Johnson & Buhalis, 2025; Vieira et al., 2025). In addition, wine tourism can support sustainability objectives by incentivizing preservation of the natural environment, responsible resource management, and environmental education, since when sustainability practices are integrated into the tourism experience, they become visible and valued by visitors, reinforcing incentives for wineries to adopt environmentally responsible behaviors, and contributing to the conservation of natural and cultural assets that underpin long-term competitiveness (Amaral et al., 2024; Brito et al., 2024).

H1. Wine tourism positively contributes to the triple bottom line by generating benefits for wineries and for the regional systems to which they belong.

2. Methodology

2.1. Case study context

Winery Magoni is a family-owned winery located in the Valle de Guadalupe, near Ensenada, the core wine-producing area of Baja California. The winery is recognised for its focus on quality wine production based on estate-grown grapes and for its strong connection to the territory and local wine culture. In recent years, this winery has deliberately incorporated wine tourism into its business model, transforming the winery into a space where visitors can engage with both the technical aspects of winemaking and the cultural narrative of the region, and through guided tastings, food pairings, and open-air visitor experiences, the winery seeks to strengthen consumer loyalty and reinforce the symbolic link between wine, landscape, and identity, which contributes to positioning the Valle de Guadalupe as a leading wine tourism destination in Mexico. The interviewee, Camillo Magoni, was born in Morbegno, Italy, and trained in oenology and viticulture at the prestigious Scuola Enologica di Alba in Piedmont, and he combines formal European winemaking education with more than five decades of professional experience in Mexico.

After early professional training in northern Italy, he relocated to Baja California in the early 1960s, where he became one of the key figures in the modern development of viticulture in the Valle de Guadalupe and its surrounding areas. His long tenure as chief winemaker for leading regional wineries and his later role in founding Winery Magoni position him as an authoritative and historically grounded voice within the Mexican wine sector. Beyond his technical expertise, Camillo Magoni has played an active role in the cultural and institutional life of this region, while his service as Honorary Consul of Italy, his recognition by the Italian government for professional merit, and his involvement in the preservation of the historical missions of the territory reflect his strong engagement with heritage and territorial identity. His authorship of the first comprehensive historical account of wine in the peninsula further reinforces his status as both practitioner and historian of the region, making him an exceptionally well-informed and credible key informant for analysing how wine tourism intersects with economic development, social dynamics, and environmental management in Baja California.

2.2. Methods and data collection

This study adopts a qualitative case study methodology to examine how wine tourism is developed within its real context and how it contributes to economic, social, and environmental outcomes at both the winery and regional levels, which is particularly suitable for this research because wine tourism is a complex, place-dependent phenomenon shaped by organizational strategies, territorial characteristics, and interactions among multiple stakeholders, allowing for an in-depth and contextualized understanding of processes and mechanisms that cannot be adequately captured through quantitative designs. The selected case is Winery Magoni, located near Ensenada, in Baja California, which was deliberately chosen due to its active involvement in wine tourism, its emphasis on experiential offerings and architectural integration with the surrounding landscape, and its role in reinforcing the regional image of Baja California as a leading wine tourism destination in Mexico. Data were collected using a qualitative, multi-source approach that combined direct observation, an in-depth interview, and the analysis of documentary materials to capture the complexity of wine tourism activities and to understand how they generate economic, social, and environmental effects within the regional context. Direct observation was conducted during visits to the winery, allowing the researchers to examine how wine tourism experiences are designed and delivered in practice, paying particular attention to the organization of visitor flows, the interaction between staff and guests, and the role of landscape, architecture, and storytelling in shaping the visitor experience, as well as assessing how concepts such as terroir expression, exclusivity, and environmental awareness are embedded in the winery's tourism offering and communicated to visitors.

To complement these observations, a semi-structured interview was conducted on 19 August 2025 with Camillo Magoni, winemaker and general manager of the winery, whose dual role, combining technical leadership in wine production with strategic oversight of tourism and organizational planning, provided a comprehensive perspective on the integration of wine tourism into the winery's business model, and addressed how tourism activities support economic performance, foster relationships with the local community, and align with environmental management practices. In addition, various documentary sources were reviewed, including institutional publications, press coverage, and audiovisual materials produced by the winery and external actors, which were used to contextualize and interpret the primary data. While statistical generalization is not the objective of this study, the combination of data sources and the interviewee's extensive experience strengthen the robustness of the findings and support their relevance for academic, managerial, and policy discussions on wine tourism and sustainability. The interview guide was structured into five thematic blocks. Table 1 summarizes the main outputs following this structure.

Table 1. Structure of the interview and summary of the findings.

Section	Summary	Level
Winery overview and strategic positioning	Winery Magoni is positioned as a quality-oriented boutique winery deeply rooted in the historical evolution of the Valle de Guadalupe, whose strategy is based on reinforcing the symbolic connection between wine, territory, and identity. In this regard, wine tourism is framed as a platform to communicate regional value rather than as a standalone commercial activity.	Contextual framing
Economic relevance of wine tourism	At the firm level, although wine tourism contributes a small percentage of direct revenues, it represents a strategically important share of Winery Magoni's income, since it provides continuous cash flow, supports financial stability, enhances brand positioning and, most importantly, it functions as a long-term mechanism to stimulate wine sales in external markets. At the regional level, wine tourism stimulates demand for accommodation, restaurants, transport, and artisanal products, reinforcing Ensenada's tourism economy, and the winery acts as part of an interconnected system in which visitor flows benefit multiple sectors, so that economic value emerges through this chain of complementary activities rather than through isolated winery performance alone.	Firm-level approach Regional-level approach
Social and cultural implications	Winery Magoni's wine tourism activities create employment, learning opportunities, and social interaction, yet their social impact depends on the integration of local residents. The interview highlights a gap between regional tourism growth and community involvement, showing that sustainable social embeddedness requires education, identity building, and long-term institutional commitment beyond individual wineries.	Firm - Community - Regional approach

Environmental dimension	Wine tourism at Winery Magoni contributes to preserving and communicating Baja California's viticultural and gastronomic heritage through storytelling, experimental vineyards, and historical narratives, and the winery promotes local varieties, traditional products, and regional knowledge as part of the visitor experience, strengthening the symbolic value of place and reinforcing the cultural identity of the Valle de Guadalupe.	Heritage and identity
	The interview reveals that wine tourism depends on cooperation among wineries, restaurants, tour operators, and local institutions. Winery Magoni sees itself as one link in a broader chain, where coordination and shared standards are essential, since without collaboration and mutual responsibility, individual efforts lose effectiveness and the regional tourism experience becomes fragmented.	Firm and regional cooperation
	Winery Magoni integrates environmental care through water reuse, protection of native vegetation, and resource-efficient practices, and treats sustainability as a necessity rather than a marketing tool, embedding it in daily operations and landscape management. In this regard, wine tourism reinforces this orientation by turning ecological explanation into part of the visitor experience.	Firm-level approach
	At the regional scale, wine tourism increases environmental pressure through real estate development and visitor flows, making regulation and coordination essential. The interview stresses that conservation cannot depend on individual wineries alone, so that protecting vineyards, endemic species, and landscape coherence requires collective governance involving residents, authorities, and tourism actors to avoid long-term ecological degradation.	Regional-level approach
Strategic outlook and future direction	The future of wine tourism in Ensenada depends on diversification, education, and territorial integration. Camillo Magoni emphasizes the need to enrich visitor experiences beyond tastings, strengthen village life, protect vineyards, and involve young generations, and underscores that wine tourism should evolve as a regional promotion platform that supports long-term economic, social, and environmental sustainability.	Future strategies and insights

Source: Own elaboration.

3. Research results

3.1. Winery development within the territorial dynamics of Ensenada

The development of Winery Magoni should be understood as part of the broader territorial dynamics shaping the wine region of Ensenada and, more specifically, the Valle de Guadalupe since, rather than evolving in isolation, the winery's trajectory reflects a process of co-evolution between firm-level strategies and regional transformation, in which wine tourism acts as a mediating mechanism. The interview evidence reveals that Winery Magoni's position within the territory is grounded in a long-term vision of viticulture, identity, and place-making, rather than in short-term tourism exploitation and, from the perspective of Camillo Magoni, the winery's development is inseparable from the historical and cultural construction of the region. With more than six decades of experience in Baja California's wine sector, he situates Winery Magoni within a lineage of pioneers who contributed to establishing quality standards and a shared territorial reputation. As he explains, "making wine in the Valle de Guadalupe has been a life objective for many of us, that is why we are here, and that is what gives meaning to what we do". This statement illustrates how the winery's development is embedded in a sense of personal and collective commitment to the territory, reinforcing the idea that wine tourism emerges as an extension of an existing regional project rather than as an exogenous activity.

Wine tourism has reinforced Winery Magoni's role as a territorial actor by transforming the winery into a point of encounter between production, visitors, and the surrounding landscape, but the interviewee consistently emphasizes that tourism is not conceived as an end in itself, but as a strategic instrument aligned with regional promotion, "I see wine tourism as brand promotion, not as an activity per se, of course it has to be economically sustainable, but its objective is to promote our wines, the region, and everything that exists around us", which is a vision that situates the winery within a broader territorial narrative, where individual success is linked to the collective image of the region. The development of Winery Magoni also reflects an awareness of the spatial and infrastructural constraints of Ensenada and the Valle de Guadalupe, since unlike consolidated wine destinations with long-established tourism infrastructures, this region remains in a transitional phase, where rapid growth coexists with structural deficiencies. The interview highlights that winery development has occurred in parallel with uneven territorial planning, generating tensions between

investment, preservation, and quality of life, which is reflected in several comments by Camillo Magoni, such as “the valley is not only the responsibility of wineries, it is the responsibility of society, authorities, and all of us together”, underscoring the interdependence between winery development and territorial governance.

Within this context, Winery Magoni positions itself as a moderate and reflective actor, advocating for a development model based on coherence and regulation rather than uncontrolled expansion, which is reflected in his refusal to incorporate large-scale gastronomic facilities, arguing that “our job is to produce wine, gastronomy professionals should do gastronomy, and we should support them by being present in their wine lists”, which reinforces territorial complementarity, avoiding internal competition among local actors and supporting the emergence of a diversified regional ecosystem. Wine tourism has also contributed to redefining the winery’s spatial relationship with the territory by encouraging continuous adaptation and incremental innovation, since development is conceived through small-scale improvements that respond to both repeat visitors and territorial coherence. As Camillo Magoni explains, “many visitors come back, and it is important for them to discover something new, even if it is something small”, which is a logic that aligns winery evolution with the rhythm of the territory, privileging continuity over spectacle. In this vein, the case highlights structural challenges that condition winery development within the territorial dynamics of Ensenada, especially regarding infrastructure and accessibility, which the interviewee identifies as critical bottlenecks for sustainable growth by stating that “you cannot talk about high-quality tourism if access roads, safety, and basic services remain the same as they were sixty years ago”, pointing out the limits of individual winery efforts and reinforcing the need for coordinated public–private action to support territorial development.

Regarding demographic and social dynamics within the region, while winery growth has generated employment and attracted investment, Camillo Magoni expresses concern about the limited integration of local residents into the evolving wine tourism economy, arguing that territorial development will remain fragile if the resident population does not feel ownership over the region’s transformation, which is reflected in several comments like “if people who live here do not feel proud of being from the Valle de Guadalupe, it is very difficult to build a sustainable future”, thus situating winery development within a broader social framework, where territorial identity becomes a prerequisite for long-term stability. Therefore, the winery’s evolution is shaped by its historical embeddedness, strategic restraint, and explicit recognition of shared responsibility for regional outcomes. Wine tourism strengthens the winery’s visibility and reinforces territorial narratives, but it also exposes structural weaknesses and governance gaps that exceed firm-level control. In this regard, winery development in emerging wine regions cannot be understood solely through internal performance indicators and must be analysed as part of a territorial system in which firms, institutions, and communities co-evolve. In the case of Winery Magoni, wine tourism acts as a connective tissue linking production, place, and people, and reveals the conditions required for sustainable regional development in Ensenada.

3.2. Wine tourism and economic performance

Wine tourism at Winery Magoni has a well-defined and strategic role in its economic model, functioning as a complementary mechanism that supports financial stability, market positioning, and long-term commercial performance. The interview reveals a deliberate approach to economic value creation, in which tourism is embedded within a broader market-oriented strategy rather than pursued as an autonomous business line. As Camillo Magoni explains, “wine tourism represents around six to eight percent of our income, at most”, so that from a strictly quantitative perspective, the direct economic contribution of wine tourism to the winery’s revenues remains relatively modest, which may reflect a conscious decision to avoid overdependence on visitor-based revenues, and to maintain the placement and performance of its wines in domestic and export markets as the core economic objective. Despite its limited direct contribution, wine tourism plays an important role in smoothing income flows and enhancing financial resilience, and as the interviewee underscores,

“those small amounts, even if they are small, are constant, and they help a lot with financial manoeuvrability”, showing how wine tourism contributes to liquidity management, reducing short-term financial pressure without altering the winery’s strategic focus.

In this regard, the economic relevance of wine tourism lies in its indirect effects on sales performance and market expansion, as the company explicitly uses it as a brand-building platform to influence future purchasing decisions beyond the winery premises. As Camillo Magoni affirms, “what we want is for the visitor to keep our image in mind and, when they are in an anonymous setting, choose our wine”, which reflects a long-term view of consumer behaviour, in which the visits to the winery shape preferences in retail and restaurant environments. He also recounts how exposure to wine tourism has led to unexpected commercial opportunities, particularly in international markets, through comments such as “we opened a market in the United States that we would not even have dreamed of a few years ago”. In this regard, participation in wine tourism activities has facilitated personal connections, strengthened brand recognition, and generated invitations to promotional events abroad, such as pairing dinners and tastings, which reveal how tourism operates as a gateway to external markets, amplifying the winery’s commercial reach without requiring large-scale marketing investments, and influencing product presentation and portfolio evaluation, thus contributing to economic learning processes within the firm.

The interviewee emphasizes that “it is not the same to see your wine on your own shelf as in an anonymous market”, observing visitor reactions to wines in the tasting environment provides valuable insights that differ from those obtained through traditional distribution channels, and allows the winery to assess labelling, pricing, and positioning strategies under real consumer interaction, and inform subsequent commercial decisions. However, the winery has deliberately avoided diversification strategies that could compromise its core identity or create conflicts within the regional ecosystem, such as the decision not to develop a gastronomic facility, since as he establishes, “our job is to produce wine, gastronomy should be done by professionals who dedicate themselves to that”, which is a choice that reinforces complementarities with local restaurants, thereby supporting cooperation and a more balanced territorial economy. Investment patterns related to wine tourism further reflect this cautious approach, since the company prioritizes incremental improvements that enhance visitor experience and preserve financial flexibility, and as the interviewee highlights, “it is important that returning visitors find something new, even if it is small”, which makes reference to the fact that investments in small-scale attractions, such as a technical library, a balsamic production space, and experimental wine displays, enrich the visit without imposing excessive fixed costs, aligning tourism-related investment with manageable financial risk and long-term sustainability.

Wine tourism has also influenced internal cost structures through increased emphasis on staff training and service quality, and although this implies additional expenditure, the interviewee views human capital investment as essential for maximizing the economic return of tourism activities, and underscores the role of service quality as a multiplier of tourism’s economic impact and as a driver of brand reputation and consumer loyalty, by affirming that “you can design the best strategies, but if the people in direct contact with visitors are not motivated, it is useless”. At the regional level, Winery Magoni’s wine tourism activities indirectly contribute to the economic vitality of Ensenada and the Valle de Guadalupe, as increased visitor flows benefit hotels, restaurants, transportation services, and artisanal producers, creating a network of interdependent economic actors. As Camillo Magoni states, “this is a chain, and it only works if all the links are aligned”, which reflects the importance of interconnectedness, since it enhances destination attractiveness and reinforces positive feedback loops between wineries and the regional economy. He also reveals structural constraints that limit the full economic potential of wine tourism, affirming that “you cannot sell a premium experience with precarious access and basic services”, since deficiencies in infrastructure, regulation, and coordination reduce efficiency and increase transaction costs for both wineries and visitors, so that the winery performance requires public investment and territorial planning.

3.3. *Social embeddedness and community effects of wine tourism*

The social dimension of wine tourism at Winery Magoni reveals a complex and uneven process of embeddedness within the local community of Ensenada and its surrounding rural areas, and rather than assuming that tourism automatically generates social cohesion, the interview evidence points to a deeper reality in which wine tourism creates opportunities for social value creation, and exposes structural gaps related to education, identity, and territorial integration, which shows that social impacts are not an automatic by-product of tourism growth but depend on deliberate collective action and long-term vision. From the perspective of Camillo Magoni, one of the most critical challenges lies in the limited involvement of the resident population in the symbolic and cultural evolution of the wine region, and despite the international visibility of the Valle de Guadalupe, “the local population has remained somewhat on the margins of this evolution”, which reflects a perceived disconnect between the expansion of wine tourism and the sense of ownership felt by residents, and suggests that social embeddedness remains partial and fragile.

In connection with the above, employment creation constitutes the most visible social contribution of wine tourism, and in this sense, Winery Magoni has experienced a gradual increase in staff linked to tourism activities, growing from a very small team to a more structured workforce as visitor flows intensified. However, the social implications of employment extend beyond numerical growth, since as the interviewee states, “we struggle to find local people, especially at intermediate and higher levels, most have to come from Ensenada”, emphasizing that one of the main difficulties is not job creation itself, but the availability of locally rooted human capital, and therefore the limitations of the local labour market and the role of structural factors, such as education and training, in shaping the social outcomes of wine tourism. In this vein, he repeatedly highlighted that education is key for deeper social integration, and that long-term social sustainability depends on cultivating pride and identification with the territory from an early age, by saying “if you do not feel proud of where you are from, it is very difficult to build anything lasting”, thus shifting the focus from short-term employment benefits to intergenerational processes of identity formation, and positioning wine tourism as a potential but insufficient driver of social transformation unless accompanied by broader educational efforts.

The company has engaged in several initiatives aimed at strengthening social ties with the community, particularly through knowledge transfer, cultural dissemination, collaborations with educational institutions, and informal training experiences, which have allowed young people to enter the winery workforce and develop professional trajectories, e.g., former students from a local preparatory school who later joined the winery team. “Some of the young people who work with us today were students who heard about these possibilities and decided to get involved” he affirms, which demonstrates how wine tourism can function as a gateway to social mobility when linked to educational exposure and mentorship, but he underscores the fragility of such initiatives when continuity is lacking, since programs depend heavily on individual commitment and institutional stability, and their interruption undermines cumulative social impact. He also says that “when the people who drive these projects change, the ideas often disappear as well”, revealing a structural weakness in the social governance of wine tourism, where initiatives are insufficiently institutionalized and therefore vulnerable to discontinuity.

Beyond employment and education, wine tourism influences social dynamics by reshaping relationships among regional actors. The interviewee underscores the importance of collaboration across wineries, service providers, and local institutions to create a coherent and welcoming social environment, by using a mechanical metaphor to describe this interdependence, “a car can have a perfect engine, but if the transmission is not connected, it will not move”, so that social value emerges from coordination and reinforces the collective nature of wine tourism as a social system. In addition, Camillo Magoni expresses concern that residents may perceive wine tourism as an external imposition rather than as a shared project, by stressing that “the valley should first and foremost be a value for those who live here”, thus situating social acceptance as a prerequisite for sustainable

tourism development and aligning with the notion that tourism must go beyond attracting external consumption and enhance residents' quality of life. He also reveals a normative dimension to social embeddedness, emphasizing responsibility and shared accountability, repeatedly rejecting the idea that social challenges can be delegated solely to public authorities, and arguing that "it does not make sense to blame the authorities for everything, responsibility is ours as well". This stance reflects a participatory view of social governance, where wineries are expected to act as proactive contributors to community well-being rather than passive beneficiaries of territorial branding.

Through storytelling, historical narratives, and the promotion of local products, the winery seeks to reconnect visitors and residents with regional heritage, and foster cultural valorisation, since cultural practices, gastronomy, and agricultural traditions can be used to reinforce identity and social meaning. Camillo Magoni highlights the importance of recognizing everyday local knowledge, noting that "true gastronomy and culture are often preserved by people who may not even be aware of their value", elevating local traditions as central elements of social sustainability rather than peripheral attractions. Nevertheless, he acknowledges persistent social tensions associated with the rapid transformation of the region, inasmuch as the arrival of new businesses, events, and investors has altered social rhythms and expectations, generating both opportunities and frictions, and stresses the importance of regulation and shared norms to prevent social fragmentation, by saying "everything is welcome, as long as it is regulated", so that it is important to balance inclusiveness with social order, since unregulated growth can erode community trust. In this vein, social development is framed in terms of generational continuity, and young people should perceive viable futures within the region. As he states, "if young people do not see a future here, then all of this loses meaning", showing the potential of wine tourism as a catalyst for long-term social reinforcement, provided that it contributes to stable livelihoods, education, and a sense of belonging, and suggesting that social sustainability in wine tourism requires intentional efforts to integrate residents, cultivate identity, and align individual initiatives with collective regional projects.

3.4. Environmental implications of wine tourism

The environmental dimension of wine tourism at Winery Magoni is framed by a strong awareness of ecological limits and by a pragmatic understanding of the fragility of the territorial ecosystem in Ensenada and its surrounding wine-growing areas. Instead of presenting wine tourism as an automatic driver of environmental improvement, Camillo Magoni reveals a more cautious perspective, in which tourism can reinforce sustainability only if it is intentionally aligned with local environmental realities and collective responsibility. In this regard, he underscores that water scarcity is a particularly important environmental constraint, by saying "if we practically do not have water, then we are forced to be efficient", so that sustainability practices are not adopted primarily for reputational reasons but out of necessity, which reflects how environmental conditions shape operational decisions and underscore the material limits within which wine tourism and viticulture must operate, e.g., the winery's reuse of treated wastewater for limited green areas reflects an adaptive strategy grounded in environmental realism rather than symbolic sustainability claims. Furthermore, the importance of preserving native vegetation and respecting ecological heterogeneity within vineyards is highlighted, "if I find an endemic plant in the middle of a vineyard, I go around it and conserve it", which is a practice that reflects a place-based environmental ethic, in which biodiversity is not treated as an obstacle to production or tourism but as an integral component of territorial value.

Wine tourism reinforces this orientation by turning landscape explanation into part of the visitor experience, thereby linking environmental stewardship to educational and interpretive functions. The interview also reveals a critical stance toward homogenized or imported aesthetic models that conflict with local ecology, since Camillo Magoni argues that environmental sustainability cannot be reduced to visual appeal, noting that "people see the native vegetation dry in summer and think it is useless, when in fact it is perfectly adapted to this environment", pointing to a broader challenge in wine tourism, that is reconciling visitor expectations with ecological authenticity. From this perspective, tourism can either exacerbate environmental pressure by encouraging artificial landscaping or

contribute positively by reshaping perceptions of what constitutes a valuable and sustainable landscape. Moreover, he offers a detailed reflection on packaging choices, particularly bottle weight, as an overlooked source of environmental impact, stating that “a heavier bottle has nothing to do with wine quality, but it generates more carbon because it requires more energy to produce”. This critique extends beyond the winery to the entire value chain, highlighting how consumer perceptions influence environmentally inefficient practices, and in this context, wine tourism becomes a potential educational channel to challenge misconceptions and promote more sustainable norms among visitors.

Despite these efforts, the interviewee expresses scepticism about the depth of environmental awareness among tourists, questioning whether visitors really understand environmental concepts such as carbon footprint, remarking that “many people do not even know what carbon footprint means”, which underscores a key limitation of wine tourism as an environmental tool, since without intentional interpretation and communication, sustainability practices may remain invisible or misunderstood, and therefore environmental impact depends both on internal practices and on the capacity to translate them into meaningful narratives for visitors. The expansion of wine tourism and associated investment raises significant environmental risks, particularly related to land use and urban pressure, and uncontrolled development is identified as one of the main threats to the ecological integrity of the region, since he warns that “the biggest risk is that vineyards become decorative gardens instead of productive agricultural units”, so that tourism-driven real estate development may displace viticultural activity, undermining both environmental sustainability and the very foundations of the wine tourism appeal. This risk is compounded by regulatory gaps and fragmented governance, inasmuch as while protected areas exist in theory, their enforcement is uneven, leading to selective compliance, “sometimes protection is respected only halfway, depending on convenience”. This critique highlights the limits of firm-level environmental commitment in the absence of coherent territorial regulation.

Wine tourism, by attracting investment and visibility, intensifies the need for coordinated environmental governance that extends beyond individual wineries, because sustainability is a shared responsibility, not a task delegated to public authorities, but Camillo Magoni explicitly rejects the tendency to externalize accountability, stating, “it is very easy to blame the authorities, but the first responsibility is ours”, thus aligning environmental outcomes with ethical agency at the firm and community levels, and suggesting that wine tourism can only contribute positively if actors internalize the consequences of their decisions. To foster these outcomes, environmental education is an essential long-term process that begins with employees and residents before reaching visitors, and he underscores that respect for the environment is rarely taught systematically and must be cultivated through everyday practices, since “people are not educated from childhood to value order, cleanliness, and conservation”, so that wine tourism offers a platform to reinforce these values, but only insofar as sustainability is embedded in organizational culture. In connection with the above, the interviewee also explained that there have been missed opportunities for collective environmental initiatives, such as the promotion of endemic species and the development of local nurseries, and suggests that “why not promote endemic plants that require little water and are part of our identity?”, suggesting how wine tourism could support broader environmental strategies by aligning landscape aesthetics, biodiversity conservation, and territorial branding.

In addition, he notes that while Baja California lacks historical architecture, it has the opportunity to build a distinctive and durable environmental identity, arguing that “we do not have gothic churches, but we can create our own long-lasting architecture and environmental style”, which is a forward-looking perspective that positions environmental sustainability as a cultural project, capable of generating future heritage, and makes clear that environmental implications of wine tourism extend beyond ecological metrics to encompass values, perceptions, and long-term territorial trajectories. Wine tourism increases visibility and pressure on natural resources, but it also creates incentives to conserve what attracts visitors in the first place, “wine tourism is the consequence of

something that was attractive, the challenge is how to conserve that interest”. This interview suggests that wine tourism can reinforce environmental awareness, resource efficiency, and landscape preservation when it is grounded in local ecological knowledge and collective responsibility but, without regulation and long-term planning, it risks accelerating environmental degradation through overdevelopment and misaligned incentives, thus showing that environmental sustainability in wine tourism is ultimately a process of continuous negotiation between economic aspirations, social values, and ecological limits.

Figure 2 shows an overview of the influence of wine tourism activities in each of these dimensions.

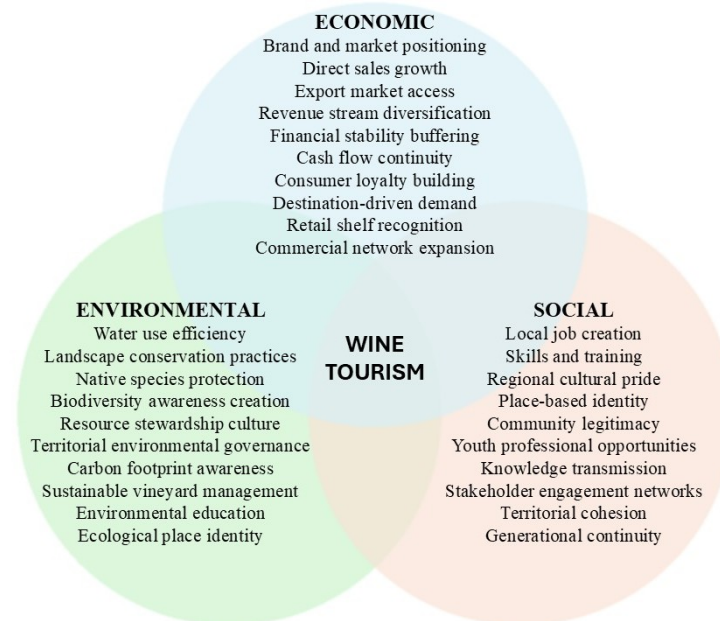


Figure 2. Influence of wine tourism at the firm and regional levels.

Source: Own elaboration.

4. Discussion

The findings of this study show that wine tourism should be interpreted as a relational and place-based mechanism through which firms connect their strategic objectives with broader territorial dynamics. In the case of Winery Magoni, wine tourism represents a relatively small proportion of direct income, but it plays a strategically important role in strengthening brand positioning, generating stable cash flows, fostering consumer loyalty, opening commercial opportunities, and reinforcing the symbolic association between wine, landscape, and regional identity. At the same time, the results reveal that wine tourism produces effects that go beyond the firm, since visitor flows activate complementary activities in accommodation, restaurants, transport, gastronomy, artisanal products, and destination promotion. Therefore, the case shows that the value of wine tourism should be understood through its capacity to connect wineries, consumers, local actors, institutions, and territorial narratives.

These findings are consistent with previous research that has analysed the sustainable contribution of wine tourism from a triple bottom line perspective. Martínez-Falcó *et al.* (2024) examined the effect of wine tourism on the sustainable performance of Spanish wineries through a quantitative structural equation model based on survey data from wineries. Their results showed that wine tourism positively contributes to economic, social, and environmental performance, suggesting that wine tourism activities can become a driver of sustainable value creation in the wine sector. The present study supports this general conclusion but adds a more qualitative and interpretive explanation of how these effects occur in practice. In Winery Magoni, economic performance is not mainly produced by the direct income obtained from tastings or visits, but through indirect mechanisms such as consumer memory, brand familiarity, market access, and the capacity to position the winery in restaurants and

external markets. This shows that wine tourism may be economically relevant even when its direct contribution to turnover is modest.

The findings also align with Sorcaru et al. (2024), who analysed Romanian wineries through survey data and PLS-SEM to examine the relationships among innovation, wine tourism experience, and sustainable wine tourism development. Their study highlighted the importance of innovation in products, services, and financing, as well as the relevance of wine tourism experiences for the sustainable development of wineries. The case of Winery Magoni underscores the importance of innovation while showing that, in emerging wine tourism destinations, being innovative does not always require large-scale investment or spectacular facilities. Instead, innovation may emerge through incremental improvements in the visitor experience, such as the creation of a technical library, experimental vineyard explanations, balsamic production spaces, storytelling activities, or interpretive narratives around grape varieties, landscape, and local history. These examples illustrate that small-scale experiential innovation can reinforce differentiation while preserving financial flexibility and territorial coherence.

Through a systematic literature review, Nave et al. (2021) showed that sustainability in wine tourism has become a central research area, but also that its development requires a multidimensional understanding of economic, social, and environmental effects. Similarly, Brito et al. (2024) reviewed strategies for achieving the sustainable development goals across the wine chain, emphasizing that sustainability requires action throughout production, tourism, consumption, and territorial systems. This study reinforces that perspective by showing that environmental sustainability in wine tourism is not limited to visible practices designed for tourists. In Winery Magoni, environmental responsibility is connected to daily operational decisions, including water reuse, preservation of endemic vegetation, efficient resource use, and reflection on the environmental effects of packaging, particularly bottle weight. These findings suggest that wine tourism can become an educational channel through which wineries communicate environmental values to visitors.

However, the findings also reveal the ambivalent nature of wine tourism. Sun and Drakeman (2022), in their study of Australia, analysed wine tourism through an environmentally extended input-output model and showed that wine tourism generates economic benefits but also considerable environmental impacts, particularly in relation to carbon emissions. Their work conceptualizes wine tourism as a “double-edged sword”, since it can support regional economies while increasing environmental pressure. The present study reaches a similar conclusion from a qualitative and territorial perspective. In Valle de Guadalupe, wine tourism contributes to regional visibility and economic activity, but it also increases pressure on water resources, land use, roads, landscape coherence, and ecological preservation. A practical example is the risk that vineyards become decorative elements for real estate or leisure developments rather than productive agricultural units. In this sense, wine tourism may preserve the landscape that attracts visitors, but it may also accelerate its degradation if growth is not properly regulated.

The social dimension of the findings is also closely connected to studies on residents, community support, and social embeddedness. Back et al. (2025) investigated resident stakeholders’ perceptions and support for wineries and wine tourism in Florida, a non-traditional wine tourism destination. Their study is relevant because it highlights that resident support is an essential condition for the success of wine tourism, especially in emerging or non-consolidated destinations. The present study supports this argument and shows that community involvement cannot be assumed as an automatic consequence of tourism growth. In Winery Magoni, wine tourism creates employment and learning opportunities, but the interview also reveals a gap between the expansion of the wine tourism economy and the degree of local resident integration. The difficulty of finding local workers for intermediate or higher-level positions illustrates that job creation alone is insufficient if the local population lacks access to training, professional development, and a strong sense of territorial belonging. Therefore, wine tourism becomes socially sustainable only when it contributes to education, identity building, and long-term community participation.

This point also connects with da Silva Flores et al. (2024), who emphasized the role of community sentience in wine tourism, and with Turčinović et al. (2025), who analysed community-led sustainable tourism in rural areas as a source of competitiveness and local empowerment. The case of Winery Magoni shows that wine tourism can strengthen local identity through storytelling, historical narratives, local gastronomy, traditional knowledge, and the valorisation of everyday cultural practices, e.g., when the winery incorporates regional products, explains the history of viticulture in Baja California, or connects visitors with the cultural meaning of the landscape, it contributes to transforming tourism into a platform for heritage transmission. However, the case also shows that this process requires continuity. Educational initiatives, training programmes, and community projects may disappear when they depend too heavily on individual actors and are not institutionalized. This finding suggests that social embeddedness requires stable governance structures.

The study also contributes to research on coopetition and territorial collaboration in wine tourism. Crick and Crick (2024), using evidence from the Canadian wine industry, analysed regional-level coopetition and its relationship with company performance, showing that collaboration among competitors in wine regions can improve performance under certain conditions. Amaral et al. (2024), through a literature review on coopetition in the wine business ecosystem, also emphasized the relevance of territorial networks, business ecosystems, and competitive advantages in vitiviniculture and wine tourism. The present study supports this view by showing that Winery Magoni understands itself as one link in a broader regional chain. Its decision not to develop a large gastronomic facility is a deliberate choice to avoid competing with restaurants and to reinforce territorial complementarity, which shows how a winery can contribute to the regional ecosystem by specializing in wine production and visitor interpretation while allowing other local actors to capture complementary value.

From a theoretical perspective, this study contributes to the wine tourism literature, extending triple bottom line approaches by showing that economic, social, and environmental impacts are interconnected processes mediated by territorial relationships. In this regard, maximizing economic value depends, to a great extent, on cooperation with restaurants, hotels, distributors, and tourism operators, while social value is shaped by education, identity formation, and community participation, and environmental value relies on shared responsibility, effective regulation, and the capacity to translate sustainability practices into meaningful visitor interpretation. Moreover, this research advances the understanding of wine tourism in emerging destinations by providing empirical evidence from Mexico, a context that remains less explored than European and Australian wine tourism regions. In this vein, it contributes to place-based and relational perspectives by showing that wine tourism acts as a connective tissue between firm strategy and regional sustainability outcomes, e.g., Winery Magoni acts as a producer of wine and a provider of tourism experiences, but also as a territorial actor whose decisions influence and are influenced by the wider development of Valle de Guadalupe.

The managerial implications are also relevant. Wineries in emerging destinations should not evaluate wine tourism only according to immediate income from visits, tastings, or direct sales. Managers should also consider its indirect strategic value in terms of brand recall, consumer education, market access, reputation, and loyalty. For example, a visitor who tastes a wine at the winery may later choose the same brand in a restaurant or supermarket because the visit created an emotional and cognitive connection with the product. Managers should therefore design wine tourism experiences as long-term brand-building mechanisms. This requires trained and motivated staff, coherent storytelling, authentic environmental practices, and continuous but manageable innovation. In practical terms, a winery can enrich the visitor experience by incorporating small interpretive elements, such as vineyard walks focused on native vegetation, explanations about water reuse, tastings linked to local food products, or narratives about the historical evolution of the region.

Another managerial implication concerns cooperation. The results suggest that wineries should avoid excessive internal diversification when it weakens the regional ecosystem. Instead of trying to control all parts of the visitor experience, wineries can build alliances with restaurants, hotels, transport providers, local artisans, educational institutions, and tour operators. For example, Winery Magoni's refusal to replace professional gastronomy with its own restaurant activity shows how strategic restraint can support regional complementarity. This approach allows wineries to focus on their core capabilities while helping other local actors benefit from visitor flows. Managers should therefore understand wine tourism as part of an ecosystem rather than as an isolated firm-level activity.

Regarding the policy implications of this investigation, public authorities should recognize that wine tourism development requires coordinated territorial governance. Infrastructure, access roads, signage, water management, safety, environmental regulation, landscape protection, and land-use planning cannot be solved by individual wineries alone. The case shows that a premium wine tourism destination cannot be consolidated if basic infrastructure and regulatory frameworks remain weak. Therefore, policymakers should promote integrated plans that protect vineyards, regulate real estate pressure, preserve endemic vegetation, support local training, and involve residents in tourism development, e.g., public programmes could support nurseries for endemic plants, training schemes for young residents, certification systems for sustainable wine tourism practices, or collaborative platforms where wineries, residents, restaurants, and authorities jointly define development priorities.

In connection with the above, it is suggested that wine tourism policy should move beyond destination promotion and focus on territorial sustainability. Attracting visitors is not enough if tourism growth generates environmental degradation, social exclusion, or fragmented development. In emerging wine regions such as Valle de Guadalupe, the main challenge is not only to increase the number of tourists, but to ensure that tourism strengthens the economic resilience of wineries, improves opportunities for local communities, and protects the ecological and cultural resources on which the destination depends. Wine tourism should therefore be managed as a regional development strategy, not merely as a marketing tool for wineries. The case of Winery Magoni shows that this is possible when wine tourism is grounded in authenticity, environmental realism, social responsibility, and cooperative territorial governance.

Conclusions

This study set out to analyse the economic, social, and environmental implications of wine tourism through an in-depth case study of Winery Magoni, located in Baja California, Mexico, and by adopting a qualitative case study approach, it provides a contextualized and process-oriented understanding of how wine tourism operates as a strategic and territorial phenomenon rather than as a standalone commercial activity. The novelty of this research lies in its integrative perspective and in its empirical focus on Mexico, a context that remains underrepresented in the international wine tourism literature, particularly with regard to the interaction between wineries and regional systems in terms of sustainability. The findings provide empirical evidence on the contribution of wine tourism to value creation in a differentiated and asymmetric manner across the three dimensions of the triple bottom line. Economically, wine tourism does not function as the main revenue engine of the winery but plays a strategically relevant role in enhancing financial stability, supporting brand positioning, and facilitating market access, while in social terms, it creates employment opportunities and fosters cultural exchange, yet its capacity to generate deep social embeddedness relies on education, continuity, and the active inclusion of local residents.

Environmentally, it reinforces awareness of ecological limits and incentivizes conservation practices, while simultaneously increasing pressure on fragile ecosystems if territorial governance and regulation are insufficient, which suggests that wine tourism can positively contribute to the triple bottom line when it is embedded within a coherent territorial vision and supported by collective

responsibility. From a theoretical perspective, this research contributes to the wine tourism literature by reinforcing the view of wine tourism as a relational and place-based process that links firm-level strategies with regional development dynamics, showing how it operates as a connective mechanism between production, market positioning, social identity, and environmental management, highlights the importance of adopting a longitudinal and interpretive lens to understand sustainability outcomes, as many of the effects of wine tourism unfold gradually and depend on cumulative interactions rather than immediate results, and unveils how emerging wine regions face distinct challenges compared to consolidated destinations, particularly regarding infrastructure, governance, and social integration, thereby extending existing theoretical frameworks to less-studied contexts. The managerial implications of this research can be of value for winery owners, managers, and workers, since it shows that wine tourism does not need to be maximized in quantitative terms to generate strategic value, but its effectiveness may require coherence with the winery's core identity, product quality, and long-term objectives.

Managers are encouraged to view wine tourism as a brand-building and learning platform, and investment decisions should prioritize service quality, staff training, and incremental innovation, while avoiding overexpansion that may compromise financial flexibility or territorial balance. Furthermore, the findings emphasize the importance of collaboration with other local actors, reinforcing complementarities. From a policy perspective, the study underscores the need for integrated and place-sensitive approaches to wine tourism development, and the key role of public authorities in providing basic infrastructure, ensuring safety, and establishing clear regulatory frameworks that balance conservation with economic dynamism, and suggests that fragmented or reactive governance limits the potential of wine tourism to contribute to sustainable regional development. Policies aimed at supporting wine tourism should therefore extend beyond promotional initiatives to include education, land-use planning, and the preservation of agricultural landscapes, and fostering cooperation between wineries, educational institutions, and local communities emerges as a key lever for strengthening social legitimacy and long-term resilience.

Regarding limitations, this study is based on a single case and a primary interview with a highly experienced and influential actor, which provides depth but limits the diversity of perspectives captured, the qualitative nature of the research does not allow for statistical generalization of the findings, and while the interview offers rich insights into strategic intentions and perceptions, future studies could benefit from incorporating additional stakeholder voices, such as employees, residents, tourists, and public officials, to further triangulate the analysis. These limitations, however, are consistent with the exploratory and theory-building objectives of the research and do not detract from its analytical contribution. Considering these limitations, future research could develop comparative case studies across multiple wineries or regions in Mexico and other emerging wine-producing countries to identify patterns and contextual differences in wine tourism development, while longitudinal research designs could capture how economic, social, and environmental impacts evolve over time as destinations mature, and mixed-method approaches combining qualitative insights with quantitative indicators could further strengthen empirical robustness. Moreover, further research could explore the role of education, governance, and resident perceptions in greater depth, shedding light on the conditions under which wine tourism becomes an inclusive and sustainable driver of regional development.

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Urbanization and Social Development among EU Countries within Attaining SDGs

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Abstract

Urban areas frequently provide improved access to resources and services; however, the presence of disparities (distribution of resources, opportunities, and services) within and among cities impedes the equitable achievement of global development objectives across EU member states. In the context of EU member states, these disparities can manifest in various ways and have significant implications for sustainable development and social equality. It is necessary to address these urban-related challenges and disparities to ensure the comprehensive implementation of sustainable development goals (SDGs) in EU countries. This paper explores the complex interplay between urbanization, social development, and the realization of SDGs in EU countries during the period from 2004 to 2021. Employing the system generalized method of moments (GMM) analysis, this study seeks to empirically validate the hypothesis suggesting that increasing urbanization is associated with enhanced social equity, which in turn positively influences the achievement of Sustainable Development Goals (SDGs). The research findings reveal a compelling pattern: as urbanization experiences growth, it stimulates a simultaneous reduction in social inequities within EU member states. Moreover, this diminishing trend in social inequalities exerts a favourable impact on the attainment of SDGs. This research contributes to the understanding of the multifaceted challenges and opportunities associated with promoting sustainable development across the diverse urban landscapes of the EU. These findings could lead policymakers to design targeted interventions and strategies aimed at fostering greater equity and inclusivity in the pursuit of the SDGs within the EU context.

Key words

social gap, no poverty, green development, sustainable development, urban area.

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Introduction

Urbanization continues to be a dominant global trend, with an increasing proportion of the population residing in urban areas. This rapid urban growth is driven by factors such as rural-to-urban migration, industrialization, and economic opportunities concentrated in cities. The migration of individuals from rural to urban environments often corresponds with expectations of improved living standards, better access to education, and enhanced healthcare services. However, this approach also brings to the forefront the challenge of addressing social disparities within urban settings. Access to essential services, social infrastructure, and opportunities must be equitable to ensure that the benefits of urbanization contribute to overall social development. Cities, as epicentres

of economic activity, offer unparalleled opportunities for education (Kosova et al., 2021) and employment. The concentration of educational institutions and job markets in urban areas attracts a diverse pool of talent, fostering an environment conducive to innovation and intellectual exchange (Fila et al., 2020; Marchesani, 2023; Trzeciak et al., 2022; Dźwigoł & Trzeciak, 2023). This connection between urbanization and educational and employment opportunities directly aligns with Sustainable Development Goal (SDG) 4 (Quality Education) and SDG 8 (Decent Work and Economic Growth). Scholars (Jiang et al., 2021; Kuddus et al., 2020; Kwilinski, 2023a; 2023b) have shown that urbanization's impact on public health underscores the intersection between urban development and social well-being. While cities provide advanced healthcare facilities and services, the density and pace of urban life also pose health challenges. Sustainable urban planning that prioritizes green spaces (Benton-Short et al., 2021), healthcare accessibility (Antosova et al., 2019; Jarvis et al., 2020; Mouratidis, 2021; Letunovska et al., 2022), and sanitation contributes directly to SDG 3 (good health and well-being). Achieving social development goals necessitates the creation of inclusive urban spaces (Benton-Short et al., 2021). Urbanization offers an opportunity to build communities that embrace diversity, foster social cohesion, and promote inclusivity. Efforts to reduce inequalities within urban settings directly contribute to SDG 10 (reduced inequalities) (Sotnyk et al., 2018; Cojocararu et al., 2022; Kwilinski et al., 2023; Kuhn, 2020). Understanding the dynamic relationship between urbanization and environmental sustainability is pivotal in the context of the SDGs. Unplanned urban growth can lead to environmental degradation, emphasizing the need for eco-friendly practices and sustainable urban planning. A striking balance between urban expansion and environmental preservation is crucial for achieving SDG 11 (sustainable cities and communities). Furthermore, Benton-Short et al., (2021) have suggested that strong social ties and community engagement contribute to the ability of urban areas to adapt to change and withstand challenges. This finding resonates with the essence of SDG 11, emphasizing the importance of resilient, inclusive, and sustainable cities.

The background of EU cities under urbanization and social development is a broad and complex topic, encompassing historical, economic, social, and environmental dimensions. A lot of EU cities have the common roots which contributes to the diverse cultural and architectural heritage seen in these cities today. Understanding the background of EU cities under urbanization and social development involves recognizing the interplay of historical legacies, economic transformations, social policies, and future challenges. Each city has its unique trajectory, but collectively they illustrate the broader trends and dynamics of urban life in the European context.

Achieving sustainable urbanization requires a holistic approach that addresses social inequalities, prioritizes environmental sustainability, and aligns with the broader framework of the SDGs. By recognizing and harnessing these connections, policymakers and urban planners pave the way for countries that not only burgeon economically but also contribute substantively to social development and the realization of sustainable development objectives (Li & Piachaud, 2006; Li et al., 2022; Jiang et al., 2022; Stan, 2022; Grodzicki & Jankiewicz, 2022). Thus, this paper aims to evaluate the interplay between urbanization and social development in attaining the SDGs. This paper introduces a novel theoretical framework for achieving Sustainable Development Goals (SDGs) by enhancing urbanization and social development policies, utilizing composite indices of SDGs, a comprehensive social development index, and advanced econometric techniques to address multifaceted challenges within the unique context of EU member states.

The paper has the following structure: Literature Review – analysis of the theoretical framework linking urbanization, social development and attaining SDGs; Materials and Methods – exploring the selected instruments and methods to check the outlined hypothesis, databases and sources; Results – explaining the empirical results on checking the research hypothesis; Discussion – comparison analysis of the obtained findings with the past related studies; Conclusions – summarizing the results of investigations, policy implications considering the findings, limitations and further directions for investigations.

1. Literature review

The intricate interplay between urbanization and social development constitutes a nuanced discourse within the broader paradigm of pursuing Sustainable Development Goals (SDGs) (Li & Piachaud, 2006; Li et al., 2022; Jiang et al., 2022; Stan, 2022; Grodzicki & Jankiewicz, 2022; Wang et al., 2022; Zhong & Chen 2022). Advocates posit that judiciously planned urban development is integral to economic growth (Addai et al., 2022; Gierałowska et al., 2022) and the creation of employment opportunities (Stan, 2022; Faragó et al., 2022), aligning with SDGs pertaining to decent work and economic prosperity (Panina, 2022; Agozie et al., 2022). According to Chen et al. (2022), the interrelations between urbanization and the 17 SDGs reveal synergies in 151 targets, 40% of which display pronounced synergies, and trade-offs are discernible in 66 targets, 18% of which manifest notable trade-offs. Through a comprehensive analysis of these dynamics within four pivotal interaction domains, Chen et al. (2022) proposed recommendations for sustainable urbanization, prioritizing considerations such as shared well-being, environmentally conscious and low-carbon urban development, the establishment of resilient cities, and the cultivation of multilateral cooperation in urban settings. Kalfas et al. (2023) confirmed the positive correlation between indicators of urbanization quality and the pursuit of sustainable development through a survey of 384 government leaders.

Xu et al. (2022), Abdulqadir (2023), Goel and Vishnoi (2022) outline that urbanization catalyze the achieving SDGs. This viewpoint emphasizes the positive impact of urbanization on achieving SDGs, particularly in the context of China's societal transformation and sub-Saharan African countries. Urbanization, when coupled with an understanding of its dynamics and thresholds, is seen as a direct contributor to sustainable development. Moreover, the role of digitalization in this context is highlighted, suggesting that it plays a crucial role in attaining SDGs and reducing social inequalities, provided there is adequate knowledge, competence, and infrastructure. Proponents Hariram et al. (2023) and Beck and Fresco (2023) argue that urbanization creates diverse and interconnected environments. These settings are seen as fertile grounds for cultural exchange, collaboration, and social integration, thereby contributing positively to the social fabric of urban areas. The scholars (Trushkina et al., 2020; Szczepańska-Woszczyna & Gatnar, 2022; Melnychenko, 2019; Lagodiienko & Yakushko, 2021) outline the conditional benefits of urbanization and digitalization. This viewpoint recognizes the potential benefits of urbanization and digitalization but also notes that their efficiency and positive impact depend on several factors. Specifically, the effects of digitalization on income share, labour force participation rate, and unemployment rate are acknowledged, but the realization of these benefits is contingent upon the availability of knowledge, competence, and infrastructure readiness. The past studies (Chancel, 2020; Whelan et al., 2023) contend that the precipitous and unregulated expansion of urban areas may disproportionately affect marginalized communities, potentially exacerbating extant social inequalities. The scholars (Rusca et al., 2023; Zhanibek et al., 2022; Miśkiewicz, 2019; Kwilinski et al., 2023; Zhong et al., 2023; Abera et al., 2022) indicated the potential negative consequences of urbanization, especially when it is unregulated or unplanned. The concern here is that rapid and unchecked urban expansion can disproportionately affect marginalized communities, leading to an exacerbation of existing social inequalities. The studies (Almulhim & Cobbinah, 2023; Tiutiunyk et al., 2021; Van den Buuse et al., 2022; Xue, 2022) underscore the complexities and inherent challenges in aligning urban development with the imperative of social inclusivity. It recognizes the potential benefits of urbanization but also the need for careful and inclusive planning to ensure that these benefits are equitably distributed and do not come at the cost of widening social gaps.

Scholars (Mahtta et al., 2022; Sasmita et al., 2023) have shown that in the context of urbanization and social development, a higher GDP per capita often correlates with improved living standards and increased access to essential services in urban areas. Sustainable development goals, such as those related to quality education; good health (Letunovska et al., 2022; Mouratidis, 2021); and reduced inequalities, benefit from a higher GDP per capita as it provides the financial resources needed to

invest in infrastructure, education (Szostek, 2021; Mihalcova et al., 2020; Lipkova, & Braga, 2016; Dzwigol, 2021a; 2021b), and healthcare (Letunovska et al., 2022; Mouratidis, 2021). However, ensuring that economic benefits are distributed equally is crucial to preventing social disparities within urban populations. Furthermore, economic growth rates are indicative of a nation's overall economic prosperity and development. In the urban context, sustained economic growth fuel infrastructure development (Levchenko et al., 2019; Trushkina, 2019), job creation (Dacko-Pikiewicz, 2019; Brun & Gnangnon, 2017; Arif et al., 2022; Roy et al., 2021), and improve social services. However, the challenge lies in ensuring that economic growth is inclusive and benefits all segments of the population, preventing the concentration of wealth in urban centers. This approach is crucial for addressing SDGs related to reducing inequality (SDG 10) and ensuring sustainable cities and communities (SDG 11). Studies (Rasoolimanesh et al., 2019; Meyer & Auriacombe, 2019; Aina et al., 2019) outline that effective governance is fundamental for addressing challenges related to urbanization, such as slum formation, inadequate infrastructure, and disparities in service delivery. Policies supporting affordable housing, social protection, and community engagement contribute to achieving SDGs related to no poverty (SDG 1), reduced inequalities, and sustainable cities and communities (Rassanjani et al., 2019; Raiden & King, 2021; Christley et al., 2021). The regulatory environment, as indicated by global governance metrics, significantly influences economic activities, the investment climate, and social well-being within urban areas. A conducive regulatory environment fosters economic growth, job creation, and social stability, directly impacting the SDGs associated with decent work and economic growth (SDG 8) and good health and well-being (SDG 3). Conversely, inadequate regulations may lead to social disparities, economic instability, and challenges in achieving SDGs.

The correlation between urbanization and social development is characterized by a complex set of viewpoints and scholarly content. Navigating these intricacies is imperative for policymakers, urban planners, and stakeholders, necessitating a nuanced understanding to formulate strategies that not only foster urban growth but also contribute positively to social well-being and the overarching objectives of the SDGs. Considering the above, the following hypothesis is highlighted:

Hypothesis: Increasing urbanization is associated with enhanced social equity, which in turn positively influences the achievement of Sustainable Development Goals (SDGs).

2. Methodology

2.1. Model specification and Methodology

To investigate the interplay among urbanization, social development, and the achievement of sustainable development goals (SDGs), the study employs the following model:

$$SDG_{it} = \alpha_0 + \beta_1 Urban_{it} + \beta_2 Social_{it} + \beta_3 Control_{it} + \varepsilon_{it} \quad (1)$$

where SDG_{it} represents the level of attainment of Sustainable Development Goals; $Urban_{it}$ signifies the degree of urbanization; $Social_{it}$ denotes the state of social development; $Control_{it}$ is the set of control variables; and ε_{it} is the error term capturing unobserved factors affecting SDG attainment not accounted for by the included variables. The coefficients β_1 and β_2 , respectively reflect the intercept, the impact of urbanization, and the influence of social development on SDG attainment.

To address issues related to data volatility and heteroscedasticity, all the data in Model (1) undergo natural logarithm processing. In the initial step, multicollinearity and correlation tests were performed to identify potential issues from significant correlations among independent variables. Next, to address econometric challenges such as multicollinearity, heteroscedasticity, serial correlation, and endogeneity, the study employed a series of panel data techniques: the random effects model, feasible generalized least squares (FGLS), and system generalized method of moments (Sys-GMM). Finally, a robustness check was conducted by substituting the social development variable

(Social) in Equation (1) with gross national income per capita and re-estimating the econometric model to assess the reliability of the empirical results.

2.2. Data

The dataset for the study comprises annual secondary data for EU countries spanning from 2008 to 2020. To determine the SDG level, this study utilized the indicator calculated based on The Sustainable Development Report's methodology, following the approach proposed in Diaz-Sarachaga et al. (2018), Lafortune et al. (2018), Korobets et al. (2020) and Kubiszewski et al. (2022). This methodology involves data normalization, removal of extreme values, and equal weighting of all 17 Sustainable Development Goals, ensuring a comprehensive assessment of a country's progress in sustainable development while identifying areas that require improvement.

Following the methodology of Zhao et al. (2022) and Geng et al. (2022), the degree of urbanization in the country (*Urban*) is measured by the proportion of the population residing in urban areas. A higher proportion of the urban population often correlates with economic growth, industrialization, and improvements in living standards. However, it also brings challenges such as increased pollution, urban congestion, and inequality.

To evaluate social development (*Social*), this study employs a composite social development index, constructed using the entropy method. This method objectively assesses the diversity or spread of values across multiple indicators, ensuring that the weights assigned to each indicator are based on their relative information content. Additionally, the entropy method minimizes subjectivity in the process, providing a more reliable and accurate measure of social development (Li et al., 2022; Jiang et al., 2022). The steps involved in the entropy method for constructing a complex index include the following steps:

1. Normalization of Indicators. Indicators of the Social Development Index are on different scales, so they need to be normalized to bring them onto a common scale:

$$X_{i,norm} = \begin{cases} \frac{X_i - \min(X)}{\max(X) - \min(X)}, & \text{positive contributors} \\ \frac{\max(X) - X_i}{\max(X) - \min(X)}, & \text{negative contributors} \end{cases} \quad (2)$$

where $X_{i,norm}$ is the normalized value of indicator X_i and $\max(X)$, $\min(X)$ are the maximum and minimum values of indicator X_i , respectively.

This step helps to ensure that each indicator contributes proportionately to the overall assessment.

2. Calculation of Indicator Entropy: For each normalized indicator, the entropy is calculated. This involves determining the probability distribution of the values and computing the entropy as a measure of their diversity.

$$E_i = -\frac{1}{\ln(n)} \sum_{j=1}^k p_{ij} \ln(p_{ij}) \quad (3)$$

$$p_{ij} = \frac{1 + X_{i,norm}}{\sum_{i=1}^n (1 + X_{i,norm})} \quad (4)$$

where p_{ij} is the normalized probability of the j th value of indicator X_i and k is the number of distinct values for X_i .

3. Weight Assignment. The weights (W_i) for each indicator are subsequently determined based on their entropy values:

$$W_i = \frac{1 - E_i}{\sum_{i=1}^n (1 - E_i)} \quad (5)$$

Higher entropy values result in lower weights, signifying that indicators with greater variability contribute less to the overall index.

4. Construction of the composite social development index (*Social*). The complex index is constructed by aggregating the normalized indicators with their assigned weights:

$$Social = \sum_{i=1}^n W_i X_{i,norm} \quad (6)$$

The composite social development index incorporates key dimensions of societal well-being and development, providing a thorough and systematic assessment of social processes. The selected indicators capture critical aspects of social well-being, including demographic, economic, health, and educational factors: demographic and health indicators (The fertility rate and life expectancy are fundamental indicators of population dynamics and public health. The fertility rate reflects demographic trends and planning requirements, while life expectancy serves as a comprehensive measure of healthcare quality and living conditions. Additionally, the under-five mortality rate and access to safely managed sanitation services serve as indicators of the effectiveness of healthcare systems and public health infrastructure, which are essential for sustainable social development); economic and labour market indicators (The Gini index, government expenditure on education, and income share of the lowest 20% measure income inequality, social equity, and economic inclusivity. The labour force participation and unemployment rates reflect the health of the labour market, economic stability, and employment opportunities within society); education and welfare indicators (School enrolment rates provide insight into societal investment in human capital, while the proportion of the population aged 65 and above highlights the challenges posed by an aging population, particularly in relation to social support and welfare). The details of the output indicators are outlined in Table 1.

Table 1. Descriptive statistics for the output variables of the composite social development index.

Variable	Mean	Std. Dev	Min	Max	Variable	Mean	Std. Dev	Min	Max
Fertility rate	1.548	0.194	1.130	2.060	Mortality rate, under 5	4.540	1.898	2.100	13.900
Gini index	31.400	3.673	23.200	42.252	People using safely managed sanitation service	83.939	11.649	42.531	99.653
Government expenditure on education	11.330	2.209	7.157	18.905	Population ages 65 and above	17.893	2.633	10.758	23.372
Income share held by lowest 20%	7.753	1.221	4.900	10.200	School enrollment	101.410	5.450	84.133	128.644
Labor force participation rate	72.044	4.934	59.250	83.842	Unemployment	8.798	4.559	2.010	27.470
Life expectancy at birth	79.255	2.953	71.812	83.832					

Source: developed by authors.

Figure 1 illustrates the results of the social development index derived using the entropy method. The analysis of social development across European Union countries highlights significant variations in societal progress.

The control variables in the model (1) were selected based on the literature (Jamel, 2020) and data availability. These include economic development, trade openness, and political stability. Economic development is a key driver of social progress and SDG achievement (Senyah, 2023). GDP per capita growth (*GDP*) is included to capture economic context and available resources for sustainable initiatives. Political stability is essential for effective policy implementation and SDG progress (Szczepańska-Woszczyzna et al., 2022). Political stability (*Political*) is assessed using the World Government Indicators, reflecting perceptions of political instability and violence. Trade openness (*TO*) measures a country's participation in international trade (Jamel, 2020). It is linked to economic integration and access to global markets and can influence urbanization and social development by impacting economic activities and employment opportunities.



Fig. 1. The social development of EU countries, 2008-2020. Vertical axis represents the level of social development. Horizontal axis shows the progression over years.

Source: developed by authors.

3. Research results

The results of the descriptive statistics are shown in Table 2.

Table 2. The descriptive statistics of the data.

Variable	Source	Symbols	Mean	Std. Dev	Min	Max
Sustainable development goals	Sustainable Development Reports	SDG	78.186	3.476	70.800	86.400
Social development	Composite index	Social	0.139	0.018	0.097	0.188
Urbanization	Eurostat	Urban	72.688	13.208	52.209	98.079
GDP per capita	World Bank	GDP	16.450	3.906	0.996	38.661
Trade openness	World Bank	TO	129.802	67.942	45.419	380.104
Political stability	World Bank	Political	0.769	0.345	-0.474	1.512

Source: developed by authors.

The VIF statistics in Table 3 indicate that the values for all variables are below 5, suggesting that there are no significant multicollinearity issues among the variables. Additionally, the correlation matrix reveals significant positive correlations between most variables.

Table 3. The VIF statistics and correlation matrix.

Symbols	VIF	1/VIF	SDG	Urban	Social	GDP	TO	Political
SDG	–	–	1.000					
Urban	1.58	0.632	0.2259* (0.0000)	1.000				
Social	1.49	0.671	0.5721* (0.0000)	0.5721* (0.0000)	1.000			
GDP	1.07	0.939	0.5039* (0.0000)	0.5423* (0.0000)	0.1161* (0.0000)	1.000		
TO	1.51	0.662	-0.3032* (0.0000)	0.1821* (0.0010)	0.1158** (0.0370)	0.1385** (0.0125)	1.000	
Political	1.6	0.625	0.2209* (0.0001)	0.1117** (0.0443)	0.2896* (0.0000)	0.3588* (0.0000)	0.4266* (0.0000)	1.000

Source: developed by authors.

The outputs of the benchmark regression analysis are presented in Table 4. According to all three models (random effects, FGLS, and Sys-GMM), urban status has a positive and statistically significant

impact on SDG achievement, with coefficients of 0.098, 0.006 and 0.088, respectively. This implies that an increase in urbanization corresponds to an increase in SDG scores. For instance, over the past decade, Germany has undergone substantial urbanization marked by the growth of its metropolitan areas, increased industrialization, and a surge in urban infrastructure development (Reicher, 2022; Asadzadeh et al., 2022). Notably, Germany has invested significantly in eco-friendly urban planning, renewable energy projects, and public transportation systems, contributing to a more sustainable and environmentally conscious urban landscape. This positive relationship suggests that a country's urbanization efforts are positively associated with its achievements in meeting its Sustainable Development Goals, reflecting the broader trend observed across EU countries. However, the example of Germany's urbanization and its associated positive outcomes on SDG achievements is illustrative but should be viewed in the context of specific national policies and initiatives. Germany's focus on eco-friendly urban planning, renewable energy, and public transportation has likely contributed significantly to its SDG achievements. However, these results might not be universally replicable, as they are influenced by a unique combination of policy decisions, economic conditions, and societal factors. This insight may guide policymakers in recognizing the potential benefits of strategic urbanization planning in contributing to sustainable development outcomes.

Table 4. The empirical results of benchmark regression.

Variable	Random effects	FGLS	Sys-GMM
	(1) SDG	(2) SDG	(3) SDG
$SDG_{i,t-1}$	–	–	0.719* (18.440)
Urban	0.098* (3.060)	0.006** (2.060)	0.088* (4.830)
Social	0.137* (7.820)	0.178* (70.400)	0.028** (2.230)
GDP	0.049* (5.610)	0.006* (4.730)	0.026* (5.380)
TO	-0.006** (-2.100)	-0.045* (-36.560)	-0.004* (-3.660)
Political	-0.001 (-0.680)	0.014* (20.600)	0.006 (2.820)*
Constant	3.993* (27.410)	4.890* (326.700)	0.801
R ²	0.447		
AR (1)			0.000
AR (2)			0.056
Sargan test			0.294
Number of obs	325	325	300

Note: *, and ** – statistically significant at 1% and 5%, respectively; z values in parentheses.

Source: developed by authors.

Social development has a highly significant positive relationship with the SDGs, as indicated by coefficients of 0.137, 0.178, and 0.028. An increase in social development is associated with a concurrent increase in SDG scores. This finding suggests that as a country makes progress in social development indicators, such as improving education, healthcare, and social welfare systems, there is a simultaneous and positive impact on its overall performance in meeting the targets outlined in the SDGs. For instance, Sweden reveals a correlation between its strong commitment to social development, marked by robust education and healthcare systems, and the observed improvement in SDG scores (Addabbo & Militello, 2023; Zheng et al., 2023). Similarly, Denmark's national policies emphasizing social inclusivity and equitable development align with the positive coefficients, demonstrating the broader applicability of these findings (Bibri et al., 2020). Even in Italy, despite regional variations, investments in education and healthcare positively contribute to SDG attainment (Ionescu et al., 2020). Conversely, GDP has a positive and statistically significant relationship with

SDGs according to the random effects model and Sys-GMM, with coefficients of 0.006 and 0.049, respectively. This suggests that higher GDP growth is linked to an increase in SDG scores. Political stability exhibits a positive and highly significant relationship with SDGs in the FGLS model, as indicated by a coefficient of 0.014. According to the other two models, political stability has a nonsignificant effect on SDGs. TO has a negative and highly significant impact on SDGs. This negative correlation may stem from increased economic inequality resulting from an uneven distribution of trade benefits, potential environmental degradation associated with intensive trade, shifts in the labour market impacting social and economic aspects, and vulnerability to global economic fluctuations. These findings underscore the intricate balance required in trade policies to align with and support the pursuit of sustainable development goals.

Given the potential endogeneity issue within the sample data, the Sys-GMM method is chosen as the fundamental estimation method for mitigating the endogeneity problem (Gunawan et al., 2023). Furthermore, the application of the Sys-GMM approach is advantageous for sample data characterized by a large N (25 countries) and a small T (13 years). The values of the AR(1), AR(2), and Sargan statistics indicate that the estimated results successfully meet the requirements of the Arellano-Bond (A-B) and Sargan tests. The Sys-GMM results reveal that a 1% increase in social development leads to a 0.028% enhancement in sustainable development goals (SDGs). Additionally, a 1% increase in urbanization is associated with an SDG improvement of 0.088%.

Tables 5 and 6 display the results of the robustness checks.

Table 5. The empirical results of robustness tests (proxy variable).

Variable	Gross National Income per Capita		
	Random effects	FGLS	Sys-GMM
$SDG_{i,t-1}$	–	–	0.712* (17.390)
Social	0.050* (6.410)	0.043* (86.030)	0.003* (5.140)
Urban	0.070** (2.000)	0.011* (6.880)	0.096* (5.290)
Control variables			
Constant	3.292* (24.000)	4.098* (489.810)	0.701* (6.360)
R ²	0.452		
AR (1)			0.000
AR (2)			0.023
Sargan test			0.560
Number of obs	325	325	300

Note: *, **, and *** – statistically significant at 1%, 5%, and 10%, respectively; z values in parentheses.

Source: developed by authors.

Table 6 displays the results of the robustness test, involving the exclusion of specific values from the sample.

Table 6. The empirical results of robustness tests (removing values from the sample).

Variable	Gross National Income per Capita		
	Random effects	FGLS	Sys-GMM
$SDG_{i,t-1}$	–	–	0.751* (18.450)
Social	0.129* (6.790)	0.046* (18.750)	0.027*** (1.890)
Urban	0.080** (2.210)	0.066* (70.330)	0.062* (3.670)
Control variables			
Constant	4.031* (25.250)	4.299* (446.570)	0.815* (5.230)
R ²	0.459		
AR (1)			0.000

Variable	Gross National Income per Capita		
	Random effects	FGLS	Sys-GMM
AR (2)			0.041
Sargan test			0.762
Number of obs	273		252

Note: *, **, and *** – statistically significant at 1%, 5%, and 10%, respectively; z values in parentheses.

Source: developed by authors.

The results of a robustness check using an alternative measure of social development are presented. Importantly, irrespective of the method or indicator employed, the consistent positive impact of social development and urbanization on SDGs remains robust and reliable.

In this instance, statistical data from Austria, Denmark, Sweden, and Germany were omitted due to their high position of SDG in the EU dataset.

The coefficients of Urban and Social for all three methods exhibit significantly positive values at the 1% and 5% significance levels, respectively. This output underscores that even after excluding particular values, the estimation outcomes consistently support the conclusion that both urbanization and social development have a positive impact on achieving SDGs.

4. Discussion

The findings of this study provide robust empirical support for the hypothesis that urbanization and social development contribute positively to SDG attainment in European Union countries. More importantly, the results extend previous research by demonstrating that urbanization and social development should be considered complementary rather than independent drivers of sustainable development.

The positive relationship identified between urbanization and SDG achievement is consistent with the findings of Xu et al. (2022), Goel and Vishnoi (2022), and Abdulqadir (2023), who argued that urbanization serves as a catalyst for sustainable development by improving economic opportunities, infrastructure provision, and access to public services. Similarly, Chen et al. (2022) reported that urbanization generates substantial synergies with the majority of SDG targets, suggesting that urban development can accelerate progress across multiple dimensions of sustainability. The positive coefficient of urbanization obtained in this study confirms these conclusions within the specific context of EU countries. However, while previous studies mainly relied on conceptual analyses, case studies, or regional evidence, the present research provides panel-data evidence covering a broad set of EU member states over an extended period, thereby strengthening the empirical support for the urbanization–SDG nexus. The obtained results also support the arguments of Hariram et al. (2023) and Beck and Ferasso (2023), who suggested that urban environments facilitate social integration, stakeholder engagement, and knowledge exchange, creating favourable conditions for sustainable development. The findings indicate that urbanization in the EU is associated not only with economic transformation but also with improvements in social outcomes, which ultimately enhance SDG performance. At the same time, the results partially contrast with studies emphasizing the adverse consequences of rapid urban expansion. Chancel (2020), Rusca et al. (2023), and Zhanibek et al. (2022) warned that uncontrolled urbanization may increase social inequalities and disproportionately affect vulnerable groups. Similarly, Almulhim and Cobbinah (2023) highlighted the risks associated with unsustainable urban growth. The present findings do not support these pessimistic perspectives in the context of EU countries. A possible explanation is that European urbanization has been accompanied by stronger institutional frameworks, social protection systems, and regional cohesion policies than those typically observed in developing economies. Consequently, urbanization in the EU appears to generate net positive effects on sustainable development outcomes.

The positive impact of social development on SDG attainment is strongly aligned with previous research emphasizing the importance of social inclusion, education, healthcare, and welfare systems for sustainable development. Studies by Mahtta et al. (2022) and Sasmita et al. (2023) demonstrated

that improvements in human development indicators contribute to higher living standards and broader socio-economic progress. Similarly, Letunovska et al. (2022) and Mouratidis (2021) emphasized the role of healthcare accessibility, whereas Szostek (2021), Mihalcova et al. (2020), and Lipkova and Braga (2016) highlighted the importance of educational investments. The positive coefficients obtained for the social development index confirm that investments in human capital and social infrastructure represent fundamental prerequisites for achieving sustainable development goals. Furthermore, the findings support the arguments of Cojocaru et al. (2022), Kuhn (2020), and Kwilinski et al. (2023), who stressed the importance of reducing inequalities as a central element of the SDG framework. The composite social development index used in this study incorporates dimensions directly related to inclusiveness and equality, suggesting that socially inclusive development pathways are associated with superior sustainability outcomes.

An important finding concerns the role of economic growth. The positive effect of GDP per capita growth on SDGs is consistent with the conclusions of Addai et al. (2022), who reported that economic prosperity provides financial resources necessary for investments in infrastructure, healthcare, and education. However, the comparatively smaller magnitude of GDP coefficients relative to urbanization and social development suggests that economic growth alone is insufficient for sustainable development. This observation supports the arguments of Hariram et al. (2023), who advocated for an integrated socio-economic-environmental perspective rather than purely growth-oriented development strategies. The negative relationship between trade openness and SDG attainment deserves particular attention. While Brun and Gnangnon (2017), Arif et al. (2022), and Jamel (2020) highlighted the potential benefits of international trade through increased economic integration and access to global markets, the present findings indicate that greater trade openness may also generate sustainability challenges. This result is consistent with studies emphasizing that globalization can exacerbate inequalities or environmental pressures if not supported by adequate regulatory frameworks. Therefore, the relationship between trade openness and sustainable development appears more complex than generally assumed and depends on the institutional capacity of countries to manage the associated social and environmental externalities.

Regarding political stability, the findings partially confirm previous studies by Rasoolimanesh et al. (2019), Meyer and Auriacombe (2019), and Aina et al. (2019), which emphasized the importance of governance quality for sustainable development. Although political stability was significant only in some model specifications, its positive coefficient suggests that stable institutional environments facilitate the implementation of long-term sustainability policies. The mixed significance levels across models indicate that governance may operate indirectly through other channels, including social development and economic performance.

This study contributes to the existing literature in three important ways. First, it empirically validates the complementary relationship between urbanization and social development in promoting SDG achievement. Second, it provides evidence that the positive effects of urbanization outweigh the potential negative consequences highlighted in part of the literature, at least within the EU context. Third, it demonstrates that social development represents one of the strongest determinants of sustainable development, suggesting that investments in education, healthcare, and social inclusion should remain central components of sustainability strategies. These findings support the growing consensus that achieving the SDGs requires an integrated approach combining economic, social, and urban development policies rather than focusing on any single dimension of development.

Conclusions

The empirical findings highlight the significance of urbanization and social development in advancing Sustainable Development Goals (SDGs), aligning with prior research (Chancel, 2020; Panina, 2022; Agozie et al., 2022; Whelan et al., 2023). Urbanization reflects a nation's developmental progress, while social development enhances quality of life, both crucial for achieving SDGs.

However, economic indicators present mixed impacts. High GDP growth, while beneficial for investments in sustainability, can also lead to environmental degradation and inequality if not managed responsibly. Similarly, trade openness fosters economic expansion and technological advancement but may exacerbate environmental and social disparities without proper policies (Brun & Gnanon, 2017; Roy et al., 2021; Arif et al., 2022).

Political stability emerges as a key determinant of SDG outcomes. Stable governance facilitates long-term planning, foreign investment, and policy continuity, essential for sustainable progress. Conversely, instability disrupts development efforts, deterring investments and creating uncertainty (Rasoolimanesh et al., 2019; Meyer & Auriacombe, 2019; Aina et al., 2019).

The study underscores the intricate interplay between urbanization, social development, economic policies, and governance in shaping SDG performance. A balanced approach—where economic growth and trade openness are pursued alongside environmental and social safeguards, and political stability is prioritized—remains crucial. These insights call for integrated, multidimensional strategies to ensure sustainability. By acknowledging these complexities, policymakers can foster resilient development pathways, ensuring that urbanization and economic growth contribute positively to long-term sustainability.

Policymakers should consider relationships between development indicators to effectively advance SDGs. EU countries should integrate sustainable urban planning strategies, as seen in Copenhagen, which prioritizes green infrastructure and cycling networks (Bibri et al., 2020). Investing in education (Gunawan et al., 2023), healthcare (Antosova et al., 2019; Jarvis et al., 2020; Mouratidis, 2021; Letunovska et al., 2022), and social services helps reduce inequalities, as demonstrated by Sweden (O'Brien & Dempsey, 2004). Germany's dual education system effectively addresses unemployment (Ganie, 2022). Civic participation models, such as neighbourhood councils in Germany, improve policymaking (Hoppe et al., 2015). Estonia's e-governance initiatives enhance civic engagement (Charles, 2009; Kalvet, 2012; Reshetnikova et al., 2019; Lagodiienko & Yakushko, 2021; Lanamäki & Tuvikene, 2022). Social entrepreneurship, supported in Sweden, fosters economic growth (Defourny & Nyssens, 2008; 2010; Gawell, 2014). Family-friendly policies, similar to Sweden's, support work-life balance (Zheng et al., 2023; Addabbo & Militello, 2023). Reducing income inequality through progressive tax policies, as seen in Denmark and Finland, lowers the Gini index (Aaberge & Bengtsson, 2024; Onofrei et al., 2023). By adopting these best practices, EU countries can develop sustainable, inclusive, and resilient communities aligned with SDGs.

Despite valuable findings, this study has limitations that future research should address. Expanding the scope to countries with different socio-economic conditions, such as the USA, China, and India, could provide a broader perspective on urbanization and social development. Additionally, factors like digital inclusion, e-business growth, and environmental sustainability should be integrated into future studies. An interdisciplinary approach examining governance, cultural dynamics, and technological innovation could enhance understanding of effective urban policies. Longitudinal studies would help identify trends and causal relationships over time. Ensuring data reliability and using robust statistical methods will further strengthen future research.

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E-commerce Orientation and Post-Pandemic Recovery: Evidence from Polish Textile Firms Listed on the Warsaw Stock Exchange

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Abstract

This research analyses the financial resilience of Polish textile and clothing firms listed on the Warsaw Stock Exchange (GPW) during the period of the pandemic known as the “COVID-19 shock” and the subsequent recovery. A comparative, year-to-year analysis of ten firms’ net revenues, net profits, total assets, equity, and profitability ratios (ROA and ROE) was conducted using publicly available annual financial statements for 2017–2023, complemented by profitability heatmaps, a growth–profitability strategy map, and fixed-effects panel contrasts to assess post-pandemic recovery patterns. The findings indicate a widespread decline in performance in 2020, subsequently followed by a strong (but uneven) normalisation in 2021–2022 and a deceleration in 2023, with considerable variation among firms and business models. These patterns are consistent with the view that differences in firms’ strategic positioning, including the ability to sustain sales and operations under mobility restrictions, may be associated with faster recovery. In addition, the study operationalises digital/omnichannel orientation using public disclosures and online-sales intensity, finding that higher pre-pandemic online intensity is associated with stronger post-2020 performance in fixed-effects contrasts, while non-parametric “rebound” tests yield more mixed evidence, underscoring that the relationship is not automatic. The evidence suggests that listed firms were largely able to restore profitability after the initial shock, but financial outcomes diverged markedly across companies.

Key words

textile-clothing companies, financial results, Warsaw Stock Exchange, COVID-19, comparative analysis, firm performance, pandemic shock, e-commerce.

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Introduction

The COVID-19 pandemic and the public-health measures adopted in 2020–2021 created a systemic shock to production, trade, and consumer demand, with particularly acute effects in industries exposed to discretionary spending and physical retail. Within the European Union, the

textile and clothing (T&C) sector is economically significant in terms of turnover, exports, investment, and employment, with a large share of small and medium-sized enterprises (SMEs) and a workforce in which women are strongly represented (Euratex, 2020). The pandemic, therefore, posed both a macroeconomic and a firm-level challenge for a sector already operating under highly competitive pressure and rapid structural change.

The T&C industry is also characterised by complex, multi-stage value chains spanning fibres, yarns, fabrics, nonwovens, and final consumer products, and by strong interdependencies with downstream industries such as automotive, construction, agriculture, and healthcare (Czajkowski, 2022). In addition, the sector's competitiveness in advanced economies is often linked to innovation and design capabilities, reflected, among other indicators, in patenting and industrial design activity (Euratex, 2024). These structural characteristics amplify vulnerability to disruptions in logistics, workforce mobility, and demand shocks—while also creating opportunities for firms that can pivot to products or channels better aligned with crisis conditions.

A key structural trend accelerated by the pandemic was digital transformation across multiple sectors and domains (Antón-Sancho et al., 2024), especially in the retail segment. In this study, digital transformation is understood operationally and narrowly as the adoption and scaling of digital sales and customer-facing capabilities: primarily e-commerce, omnichannel distribution, and digitally mediated customer engagement; reported in firms' public disclosures and reflected in their strategic responses to mobility restrictions (McKinsey, 2021). Beyond sales channels, the broader literature also emphasises digital tools in supply-chain visibility, planning, inventory management, and analytics (Fatorachian & Ramesh, 2025); however, this article focuses on the sales-channel dimension because it is the most consistently observable across firms' publicly available reporting and is central to the pandemic shock affecting physical retail.

Sector-level evidence for 2020 indicates a pronounced negative impact across Europe. Euratex reported a decline in turnover in both textiles and clothing between 2020 and 2019, with heterogeneity across sub-sectors and relative resilience in nonwovens linked to medical applications (Euratex, 2021). Retail trade in textiles and clothing experienced particularly severe contraction during lockdowns, while supply-chain disruptions and customer-industry interruptions also affected firms producing technical textiles and composite-related inputs (Euratex, 2024). At the same time, shifts in consumer behaviour and restricted access to physical stores contributed to a marked expansion of online purchasing, prompting many firms to accelerate e-commerce and related digital customer interfaces as a continuity strategy.

In Poland, aggregate sector revenues suggest a smaller decline in 2020 than at the EU level, followed by a return to growth (Sezgin, 2025). However, aggregate figures can mask substantial heterogeneity because they include firms with very different business models and product profiles, ranging from consumer apparel retail to technical textiles and nonwovens associated with healthcare demand. Understanding the pandemic's firm-level impact therefore requires analysis not only at the sectoral aggregate level but at the company level as well.

Existing research on COVID-19 impacts in the T&C sector has examined multiple national contexts, including Türkiye, New Zealand, Sweden, Finland, the UK, Bangladesh, Ukraine, China, Pakistan, Indonesia, and India (Akşit & Kanat, 2025; Nautiyal et al., 2023; Wulff, 2022; Haukkala et al., 2023; BFTT, 2023; Pritha et al., 2022; Shandrivska & Yunko, 2021; Zhu & Chiu, 2021; Shah et al., 2024; Sari & Afiatno, 2022; Varadaraj et al., 2022). However, the literature lacks a cumulative, firm-level assessment for Poland that spans pre-pandemic, pandemic, and post-pandemic recovery years using comparable financial metrics. This constitutes a clear empirical gap, particularly for publicly listed firms where audited, longitudinal financial data are systematically available.

To address this gap, the present study analyses the annual financial performance of T&C companies listed on the Warsaw Stock Exchange (GPW) over 2017–2023. The analysis is guided by the following research questions:

RQ1: How did key financial outcomes: net revenues, net profit/loss, total assets, equity, ROA, and ROE, evolve across GPW-listed Polish T&C firms before (2017–2019), during (2020), and after the pandemic shock (2021–2023)?

RQ2: How heterogeneous were the pandemic impact and recovery patterns across firms with different business profiles (e.g., consumer apparel retail versus technical textiles/nonwovens)?

RQ3: Are observed recovery trajectories descriptively consistent with firms that intensified digital sales and omnichannel approaches during the pandemic, as indicated in public disclosures? RQ3 is examined through the following hypothesis: Firms with greater digital/omnichannel orientation exhibit stronger post-pandemic recovery in terms of revenues and profitability during 2021–2023.

The main contribution of this article is to provide a cumulative firm-level assessment of the financial resilience and post-pandemic recovery of Polish textile and clothing firms listed on the Warsaw Stock Exchange, covering the full pre-shock, shock, and recovery cycle (2017–2023) with comparable audited financial data. This contribution addresses a gap in the literature by offering the first longitudinal assessment of firms in Poland. Based on this key finding, the study also examines the variety of recovery trajectories across business models and explores whether post-pandemic performance patterns are consistent with firms' digital/omnichannel orientation. This is achieved by analysing public disclosures, online sales intensity, fixed-effects contrasts and non-parametric rebound tests.

The remainder of the article is structured as follows: First, the conceptual framework and extant evidence on financial resilience and digital transformation in the textile and apparel sector are presented. In the following section, the reader will find a detailed exposition of the sample, data sources, and procedure for constructing financial indicators for the period 2017 - 2023. Subsequently, the comparative results prior to the pandemic, during the pandemic, and in the recovery phase are presented, with a focus on the identification of common patterns and the acknowledgment of heterogeneity among companies. The results are then discussed in the light of the extant literature and differences in business models, paying particular attention to the possible association with digital strategies. In conclusion, a synopsis of the study's findings, implications, limitations, and prospective avenues for future research is provided.

1. Literature review

Financial resilience has been conceptualized as a multidimensional capacity to absorb adversity, maintain economic functioning, and recover stability (Salignac et al., 2019). This construction requires metrics that integrate resources, behaviour, and conditions of financial access. Evidence also highlights that resilience depends on enabling factors (e.g., liquidity, planning, strategy, and operational management), which can be identified and prioritized for measurement and comparison (Zahedi et al., 2021). In parallel, the literature on financial literacy shows that financial knowledge is associated with lower exposure to risky decisions and greater coping capacity in the face of shocks, providing a complementary framework for interpreting resilience (Klapper & Lusardi, 2019).

During the SARS-CoV-2 pandemic, commonly referred to as “COVID-19,” the resilience and recovery capacity of organizations was significantly affected by supply chain disruptions, strengthening the need to investigate and understand adaptation processes in environments characterized by a high degree of uncertainty (Ozdemir et al., 2022). In this context, digitalization emerges as a potential mechanism, as indicated by Abidi et al. (2023). In a company level study, these authors find that companies with greater digital investments and capabilities suffered smaller declines in sales and showed greater adjustment capacity. Furthermore, the findings suggest that the comprehensive and large scale implementation of digital technologies is favourably associated with the ability to recover from disruptions, although with variations depending on the degree of adoption (Li et al., 2022). From a financial perspective, digital finance infrastructure has the potential to facilitate access to sources of financing and accelerate recovery, which can contribute to strengthening corporate resilience in listed companies (Xia et al., 2022).

In the textile and clothing sector there is evidence that the emergence of the disease known as SARS-CoV-2, had a simultaneous impact on demand, supply, and value chain factors at the global level, causing asymmetrical effects among the different subsectors of this industry, such as the fashion sector in contrast to the nonwovens and healthcare sectors. This situation required a rapid reconfiguration of production and logistics processes (Seidu et al., 2024; Zhao & Kim, 2021). In this context, studies highlight that resilience is not limited to “withstanding” the impact, but also involves the application of strategies to adapt supplies, reduce delivery times, and mitigate disruptions through the use of nearshoring/local sourcing and interorganizational coordination. This approach is aligned with dynamic capabilities approaches in textile chains (Farrukh & Sajjad, 2024; Pallás-Rocafull et al., 2023). Empirical evidence at the company level show heterogeneity in performance during the pandemic, associated with company level characteristics (structure, exposure to retail trade, etc.) and size, with different results between transnational companies and smaller or more specialized profiles (Cho & Saki, 2021; Santos & Castanho, 2022). At the same time, there is a growing emphasis on sustainability practices (including circularity) as complementary levers of competitiveness and resilience in the post - Covid era, although the evidence is often cross cutting and context dependent (D'Adamo & Lupi, 2021; Weerasinghe et al., 2023). More broadly, recent literature has also linked digital transformation with sustainable development and ESG performance, suggesting that digitalization may have implications beyond operational continuity and financial resilience (Kwilinski, 2023a, 2023b). Taken together, this literature supports the need for comparative longitudinal analyses of listed companies to capture pre-shock/shock/recovery trajectories and their sectoral mechanisms.

In turn, in the textile and clothing industry, financial resilience and recovery are intrinsically linked to efficient working capital management. This relationship is attributed to factors such as the seasonal nature of demand, inventory levels, and trade terms. Consequently, there is evidence of the relevance of adopting a “dynamic” approach in assessing working capital and operating liquidity needs (Ramos et al., 2018). During the COVID-19 pandemic, evidence obtained for companies in the fashion sector in Poland show that liquidity assessment requires context sensitive metrics (e.g., cash ratio) and allows for the detection of differential changes compared to the retail sector as a whole (Piosik, 2022). From a financial stress perspective, methods based on financial statements have been proposed to estimate liquidity needs under scenarios of falling sales, which are useful for anticipating illiquidity points and quantifying financing gaps (Schivardi & Romano, 2020). In the Polish context, evidence from industrial enterprises show that financial threat (distress) evolves heterogeneously across firms and can be profiled using early warning modelling approaches, reinforcing the usefulness of firm level, longitudinal comparisons when assessing crisis exposure and recovery patterns (Kaczmarek et al., 2021). At the same time, studies on European textiles suggest that corporate size and structure influence performance during the crisis, reinforcing the need for firm level comparisons (Santos & Castanho, 2022). Ultimately, the push toward advanced textiles and “smart textiles” in the wake of the pandemic has the potential to generate technological opportunities, but also to increase investment demand and, thus, increase liquidity and financing pressures (Ivanoska-Dacikj et al., 2023).

According to the recent research, existing literature agrees that the outbreak of the pandemic caused “forced” digitization in the fashion and textile sectors, widening the gap between leaders and laggards in digital capabilities and omnichannel execution (Gonzalo et al., 2020; Zhao & Kim, 2021). In the context of SMEs, digital transformation is conceived as a set of responses aimed at operational continuity, based on knowledge strategies and process redesign, rather than isolated technological changes (Klein & Todesco, 2021). Evidence from other organizational settings point in the same direction: in agri-food cooperatives, information technologies are associated with greater efficiency when combined with innovation capacity and knowledge-oriented leadership, while research on worker-owned enterprises highlight that the pandemic accelerated digitalization and reinforced the need to promote the use of digital technologies (Moreno-Domínguez et al., 2025; Fernández-

Guadaño et al., 2025). In the apparel retail sector, empirical findings indicate that the economic crisis acted as a catalyst for channel integration (online-offline) and business model reconfiguration, with the aim of maintaining sales in contexts of mobility restrictions (Acquila-Natale et al., 2022; Wulff, 2022). At the same time, sectoral studies emphasize that digitalization must be understood broadly: including data capabilities, chain coordination, and business model redesign in order to link it to performance and resilience (Akhtar et al., 2022). Recent e-commerce research likewise indicate that e-commerce performance depends not only on channel adoption itself, but also on complementary organizational and technological capabilities, including management orientation, digital competency, innovation capability, accounting information systems, and artificial intelligence (Johri et al., 2025). In addition, emerging perspectives such as Society 5.0 emphasize the growing role of AI, big data, blockchain, personalization, and sustainability-oriented practices in shaping the future evolution of e-commerce (Bernovskis et al., 2024). In turn, the pandemic puts significant pressure on commercial channels, fostering the need to reconfigure them toward e-commerce. This process has been driven by the acceleration in the adoption of e-commerce strategies, which have emerged as a crucial mechanism for ensuring continuity and recovery in the current context. A sector review shows how the impact of the shock affected performance and how innovation (in products and processes) helped sustain activity in different branches of the textile industry (Seidu et al., 2024). In the Chinese context, the growth of e-commerce in the textile sector has been associated with the emergence of new business models and the accelerated expansion of digital platforms during the novel coronavirus disease pandemic (Junzhi, 2021). In the SME sector, various empirical studies have shown that the adoption of e-commerce and digital marketing strategies has been positively associated with financial performance and aspects of sustainability in health crisis contexts (Budiarto et al., 2021; Gao et al., 2023). In addition, several studies establish a correlation between e-commerce and resilience, as well as export capacity, suggesting a buffering role in the face of disruptions (Onjewu et al., 2022; Vo et al., 2022). In the fashion and textile sector, several business case studies have shown that the online channel has played a crucial role in mitigating sales declines and recovering economic activity (Rađenović et al., 2023).

In the textile sector and its business performance in the face of the COVID-19 crisis, research have been conducted combining market approaches, such as event studies and profitability, with accounting metrics, such as profitability, efficiency, and liquidity. Consistent with this mixed perspective, evidence from WIG30 firms on the Warsaw Stock Exchange show that expectations based market value creation metrics reveal heterogeneous value creation profiles and periods of insufficient value creation, highlighting that accounting profitability and market-based assessments may diverge in stress and recovery contexts (Kaczmarek & Náñez Alonso, 2025). In the US context, stock market reactions and fluctuations in the performance of textile and apparel companies have been recorded in the context of health shocks and economic assistance measures (Cho & Saki, 2021). Simultaneously, sectoral research reveal that the pandemic increased volatility and amplified heterogeneous impacts across industries, including the textile and apparel sector (Zhang et al., 2022). Similarly, the pandemic has been associated with variations in stock market returns in emerging markets such as Vietnam (Hung et al., 2021). Accounting evidence in Indonesia and Bangladesh also suggest a deterioration in the performance of listed companies during 2020, with results sensitive to the subsector and financial structure (Devi et al., 2020; Kabir & Bin Saleh, 2020). In the textile context, there is evidence of a disparity in impact, which can be modulated by factors such as size and fixed costs, as suggested by findings in textile corporations in Portugal (Santos & Castanho, 2022). In addition, measures of market power and productivity (e.g., price-cost margin) have been used to identify the determinants of pre/post-COVID performance in the Indonesian TPT (Setiawan & Septiani, 2025). From a financial slack perspective, financial flexibility has been positively associated with performance in the machinery and textile industries during periods of economic instability (Teng et al., 2021). With regard to risk management, higher ESG standards have been found to be associated with reduced price volatility (with effects that may vary depending on size), which is

relevant for listed textiles in periods of stress (Shakil, 2020). Ultimately, the specialized literature concludes that the global economic crisis resulted in a combination of factors that affected demand, supply chain, and incentives for innovation in the textile sector. These changes conditioned business results and strategies (Seidu et al., 2024). On the other hand, sustainability practices have been found to be associated with organizational performance in the textile and clothing sector in crisis economies (Weerasinghe et al., 2023).

2. Methodology

This research is based on audited and publicly available financial information from companies listed on the Warsaw Stock Exchange (GPW). The sample includes entities belonging to the textile and clothing sectors that (i) are listed on the GPW, (ii) disclose annual reports with comparable accounting items, and (iii) were still operating at the time of the study and data collection. This research is based on company yearly observation, which constitutes the unit of analysis. Specifically, the companies in the textile and apparel sector included are: Wittchen, Vistula Group (VRG), Sanwil, Novita, Monnari, Lubawa, LPP, Lentex, Esotiq & Henderson, and Answear. These companies constitute a heterogeneous sample of business models within the Polish textile and clothing sector in general: retail/clothing brands, e-commerce, technical textiles, and nonwovens, allowing for an exploratory assessment of the behavior of different profiles during the pandemic crisis and recovery. More information on these companies is provided in the Annex, as Table A.1. The observation period covers the fiscal years 2017 to 2023, allowing for comparisons between the pre-pandemic (2017-2019), crisis (2020), and recovery (2021-2023) periods.

The financial data was collected between July and August 2025 by reviewing two financial information portals (bankier.pl and stockwatch.pl) and, where necessary, the companies' official annual reports, depending on the availability and quality of the data. The following basic accounting variables were considered for the analysis: net income, net profit/loss, total assets, and net equity (shareholders' equity). Based on these items, the study derives three main results: (i) year-on-year changes for each company and variable, (ii) the cumulative change (2023 vs. 2017) to capture overall performance over the seven-year period, and (iii) profitability ratios (ROA and ROE) to summarize operating efficiency and return on equity.

In our research, we started with a comparative, descriptive, and annual (YoY) analysis of the financial statements of publicly traded textile and apparel companies during the period 2017 - 2023. The objective was to document patterns consistent with financial resilience, i.e., the ability to absorb the 2020 crisis and recover performance during the period 2021–2023. For each company i , and each year t , the year-over-year (YoY) percentage change is calculated for each accounting item as follows, as shown in equation 1:

$$\Delta X_{i,t}(\%) = \frac{X_{i,t} - X_{i,t-1}}{X_{i,t-1}} \times 100 \quad (1)$$

The cumulative change is then calculated as shown in equation 2:

$$\Delta X_{i,2023/2017}(\%) = \frac{X_{i,2023} - X_{i,2017}}{X_{i,2017}} \times 100 \quad (2)$$

In addition to the results at the company level, aggregate dynamics between companies (totals) have been calculated and, when used, cross-sectional summaries (averages) intended to serve as a sectoral indication. To complement the gross accounting items, the analysis calculates the return on assets (ROA) and return on equity (ROE) for each company year. ROA is interpreted as the efficiency in generating profits from the asset base, while ROE reflects profitability in relation to equity capital (Bilińska-Reformat & Dewalska-Opitek, 2021). The formulas are shown in equations 3 and 4, respectively:

$$ROA_{i,t} = (NetProfit_{i,t} / TotalAssets_{i,t}) \times 100 \quad (3)$$

$$ROE_{i,t} = (NetProfit_{i,t} / Equity_{i,t}) \times 100 \quad (4)$$

In order to complement the tabular analysis and facilitate inter-firm comparison throughout the 2017–2023 cycle, two visualization tools were incorporated.

First, a profitability heatmap was created that shows the ROA and ROE values for each company and year. This matrix allows us to identify temporal patterns (persistence, episodes of deterioration and recovery) and heterogeneity among companies in terms of profitability.

Second, a growth – profitability strategy map in bubble scatter format was used. The horizontal axis corresponds to the compound annual growth rate (CAGR) of net income between 2017 and 2023, which was calculated using equation 5:

$$CAGR_i = [(Incomes_{i,2023} / Incomes_{i,2017})^{(1/6)} - 1] \times 100 \quad (5)$$

This allows us to define interpretive quadrants (high/low growth and high/low profitability). In order to test the hypotheses derived from RQ3, a difference-in-differences specification with firm and year fixed effects was chosen because it fits the structure of the data and the research objective. The dataset follows the same firms over 2017 - 2023, and the aim is to compare whether post-2020 trajectories differed according to firms' digital/omnichannel orientation rather than merely to contrast average outcomes before and after the pandemic. Firm fixed effects absorb time-invariant differences across companies, such as business model or positioning, while year fixed effects absorb shocks common to all firms, including the pandemic year, reopening, and the 2023 slowdown. Compared with a simple pre/post comparison, a cross-sectional analysis, or a pooled regression, this specification makes fuller use of the panel structure and provides a parsimonious way to estimate differential post-pandemic performance associated with digital orientation (Imai & Kim, 2020; de Chaisemartin & D'Haultfoeuille, 2022). The key explanatory variable captures digital/omnichannel intensification based on public disclosures (annual reports, corporate communications) and is operationalized in two complementary ways: first, a treatment indicator must be considered, i.e., a company that explicitly shows acceleration in e-commerce and omnichannel. Second, a continuous measure of digital intensity based on the percentage of online sales over total sales, and/or its year-on-year variation, must be considered. Given that the dataset contains two variants of the online % table (10 firms versus 6 with an online channel), the model is estimated both in the complete sample (coding the 4 mainly B2B firms as zero online intensity) and in the subsample of 6 firms with online sales (exploiting intensity gradients). The equation applicable to this case would be (equation 6):

$$y_{it} = \alpha_i + \delta_t + \beta(Digital_i \times Post_t) + \varepsilon_{it} \quad (6)$$

where y_{it} represents performance/recovery metrics (e.g., net revenues, net profit, ROA, and ROE), controls for firm-invariant heterogeneity (business model, positioning), absorbs common shocks (2020 restrictions, 2021 – 2022 reopening, 2023 slowdown), and $Post_t$ identifies the recovery period (2021–2023). The parameter β assesses whether, following the pandemic, companies with greater digital momentum show differentially superior recovery trajectories in terms of accounting and profitability, which constitutes evidence of descriptive consistency with the narrative of digitization/omnichannel.

The inference is reported with robust standard errors grouped by company, and, given the low number of companies, conservative p-values are prioritized. Because digital/omnichannel orientation may be endogenous, the estimated coefficients are interpreted as descriptive associations rather than causal effects. Firm fixed effects absorb time-invariant differences across companies, and year fixed effects absorb common shocks, while the use of pre-pandemic online-sales intensity reduces

simultaneity with post-pandemic outcomes. However, these features do not eliminate the possibility that firms with stronger pre-existing capabilities were both more likely to invest in e-commerce and more likely to recover faster after 2020.

As a complementary verification to the above, we apply a Mann – Whitney U test comparing a synthetic indicator of recovery between groups of companies with different digital orientations. The outcome is defined as a measure of “rebound” relative to the pre-COVID level.

$$\Delta y = y_{2021-2022} - y_{2019} \text{ ratio } y_{2021-2022}/y_{2019}, \text{ for income and/or profitability} \quad (7)$$

The main partition follows the data structure: (a) firms with an online channel (6) vs. predominantly B2B firms (4), and (b) within the 6 online firms, comparison of high vs. low intensity using the percentage of online sales (or its increase during 2020–2021). The Mann–Whitney test contrasts whether the distribution of the “rebound” is stochastically greater in the group with greater digitization/omnichannel. This contrast does not impose normality or homogeneous variances and therefore serves as additional evidence that the observed trajectories are consistent (in descriptive terms) with a cushioning and recovery mechanism associated with the intensification of the digital channel during and after the pandemic shock.

3. Research results

As can be seen in the dataset included in the data availability section, these tables jointly document how the Polish textile–clothing (T-C) sector’s listed firms adjusted to the COVID-19 shock through their income statements and balance sheets. Across the sample, the pandemic year (2020) marks the main structural break, followed by a fast, but uneven, normalization in 2021–2022 and a clear deceleration in 2023. As shown in Figure 1, net revenues indexed to 2017 reveal a pronounced divergence across firms, with Answear’s structural expansion contrasting with the pandemic shock and subsequent rebound observed in retail-oriented companies (see dataset in availability section).

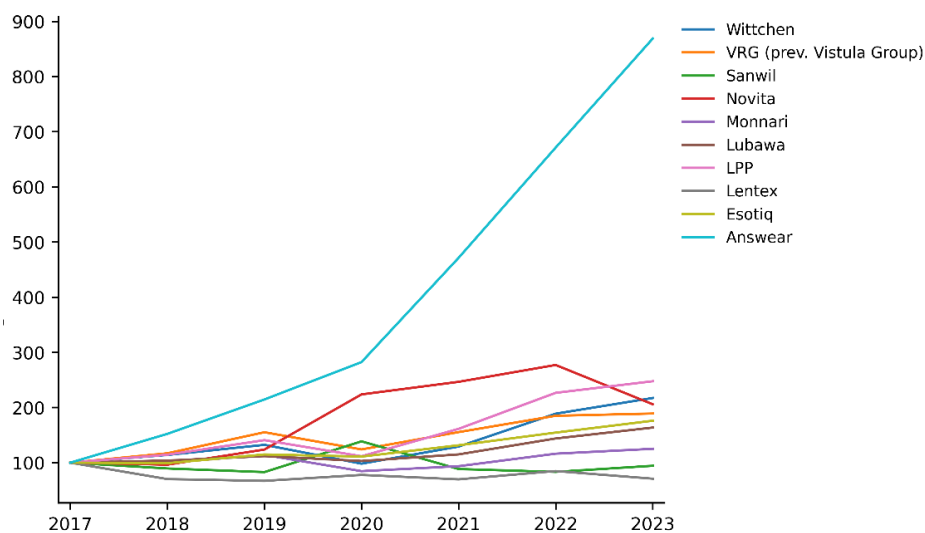


Figure 1. Indexed net income trajectories (2017 = 100).

Source: own elaboration based on the data from the indicated financial portals or the companies’ yearly reports.

Figure 1 shows the variation in indexed net income (2017=100), revealing significant diversity among companies in the sector. Answear stands out, with exceptional and sustained growth through 2023 (index close to 870, consistent with a cumulative increase well above the rest), indicating structural expansion rather than a temporary rebound. In contrast, several companies in the retail and fashion sector reflect the impact of 2020 and a subsequent recovery. LPP and Wittchen show a downward trend until the pandemic year, then experience an increase in 2021–2022, stabilizing in

2023 at levels significantly higher than those recorded in 2017. Novita, for its part, shows a more cyclical pattern, characterized by a significant increase during the pandemic (probably due to healthcare demand), followed by a normalization in 2023. Ultimately, Lentex is the most fragile case of the period, with an index below 100 in recent years and a relative contraction compared to 2017. Analysis of the data set reveals that the sector's recovery after 2020 was genuine, albeit asymmetrical and dependent on the specific business model. In Table A.2 (net revenues), 2020 stands out as a sector-wide contraction: total net revenues for the examined firms fell by >17% year-on-year. The largest drops were concentrated among clothing/retail-oriented companies: Wittchen and Monnari (each >25% decline), as well as VRG and LPP (each >20% decline); consistent with demand compression and disruptions in physical retail. At the same time, the shock created “winners” linked to medical/protective materials: Novita increased revenues by >80% and Sanwil by >67%. The post-pandemic rebound was strong in aggregate (total revenue growth of ~39% in 2021 and >37% in 2022), but firm trajectories diverged: LPP illustrates a classic collapse-and-recovery profile (about +44% in 2021 and +40% in 2022 after the 2020 fall), while Answer shows persistent scaling (+67% in 2021 and >42% in 2022). By contrast, some pandemic-era gains proved transitory: Sanwil and Lentex later recorded marked revenue declines (approximately >36% and >10%, respectively). In 2023, sector momentum weakened (total growth only ~9%), with Answer still expanding, but Novita and LPP contracting (by >25% and >16%, respectively). Over the full horizon (2017–2023), total net revenues rose by >135% (for the companies comparable across the period), driven disproportionately by Answer (+768%), with strong long-run increases also for LPP (>147%) and Wittchen (>117%).

The profit dynamics in Table A.3 (net profit) reinforce this interpretation. In 2020, most firms experienced profit compression, yet the depth of the decline depended on business model and product exposure. Wittchen, for example, saw a sharp drop but remained profitable; suggesting partial buffering through channel diversification (including e-commerce). In contrast, firms connected to medical/material demand (e.g., Novita, Sanwil, Lentex) displayed comparatively better outcomes during the shock. The subsequent year (2021) brought a broad profit rebound, with particularly strong improvements among retail-focused firms (Wittchen, VRG, Monnari, LPP, Esotiq, Answer), consistent with reopening effects and operating leverage after a depressed base. Balance-sheet aggregates adjusted more gradually. Table A.4 (assets) indicates a pandemic-era slowdown rather than a collapse; notably, the year-on-year change in 2022/2021 appears weaker in percentage terms than in 2020/2019, suggesting that normalization did not eliminate investment and valuation headwinds. The most pronounced asset expansion is associated with growth strategies (especially Answer and LPP); whereas Lentex is the sole firm with a sizeable asset contraction (about –28%). Finally, Table A.5 (equity/own capital) mirrors these patterns: Answer records the largest cumulative increase (>750% from 2017 to 2023), while Lentex is again the only firm with a material decline (about –25%). Importantly, at the aggregate level, the only negative equity change occurs in 2020, followed by a rebound in 2021, when almost all companies rebuild capital relative to 2019 (with Monnari and Lentex as exceptions). These developments in revenues, profits, assets, and equity set the empirical foundation for the next step of the analysis, where profitability and capital efficiency will be examined using ROA and ROE for the same set of companies.

To complement the tables above, which show the annual evolution of accounting figures and ratios and analyze ROA-ROE tables (see tables of dataset include in data availability section), two figures have been added that allow us to: (i) visualize profitability patterns throughout the pandemic cycle, and (ii) rank companies according to the growth-profitability binomial, taking size into account.

Figure 2 provides a compact, firm-by-firm view of profitability dynamics by combining ROA and ROE in a two-panel heat map. Two patterns stand out immediately. First, profitability is highly heterogeneous across companies and years, indicating that sector-wide shocks translated into asymmetric firm-level outcomes.

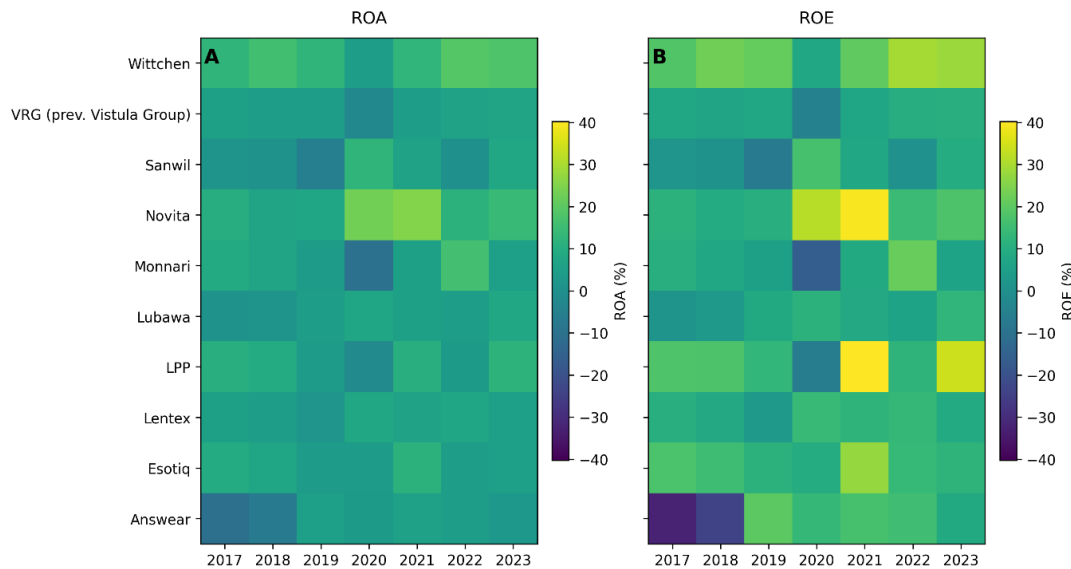


Figure 2. Heat map of profitability by company and year (ROA and ROE).

Source: own elaboration based on the data from the indicated financial portals or the companies' yearly reports.

Second, dispersion is visibly larger for ROE than for ROA, which is consistent with the amplifying role of capital structure (and changes in equity base) in the return to shareholders. This difference is also evident in the underlying values: across 2017 - 2023, ROA ranges from -10.4% to 25.4%; while ROE ranges from -32.5% to 40.3%, i.e., a substantially wider amplitude on the equity side. The heat map therefore supports an interpretation in which operating profitability (ROA) is comparatively “bounded,” whereas shareholder returns (ROE) swing more strongly with leverage and equity dynamics; particularly in years of disruption and rapid recovery. Several companies illustrate these mechanisms particularly well. LPP is the clearest example of leverage-driven asymmetry: in 2020, it records negative profitability (ROA -1.8%, ROE -6.2%), followed by an exceptional rebound in 2021 where ROE peaks at about 40.3% while ROA is only 10.6%. The large wedge between ROE and ROA (roughly 30 p.p.) is indicative of a strong equity multiplier effect and/or equity base adjustments during the recovery phase. In contrast, Wittchen displays a more “stable high performer” profile, keeping ROA positive throughout and reaching 19.1% (ROA) and 29.3% (ROE) in 2022, suggesting robust operational profitability with less extreme equity amplification. At the other end of the spectrum, Answear shows pronounced early weakness and subsequent normalization: it begins with negative ROA (-10.4% in 2017) and very negative ROE (-32.5% in 2017), then turns consistently positive from 2019 onward. Notably, however, its ROA remains in low single digits in later years despite positive ROE (e.g., ROA 2.6% vs. ROE 8.7% in 2023), pointing to comparatively modest asset profitability even as shareholder returns improve. Finally, pandemic-related “beneficiaries” are visible in the concentration of high values for Novita, where ROA peaks at 25.4% (2021) and ROE reaches 39.5% (2021), followed by lower (though still positive); returns as conditions normalize, consistent with a temporary demand shock rather than a permanent profitability shift.

Figure 3 maps firms' long-run strategic positioning by jointly displaying net revenue growth (CAGR 2017–2023) on the horizontal axis and average ROE (2017–2023) on the vertical axis, while bubble size captures scale through average assets. The crosshair reference lines (sample means) partition the space into four quadrants, enabling a compact interpretation of the trade-off between expansion and shareholder profitability over the full period, rather than in single-year snapshots.

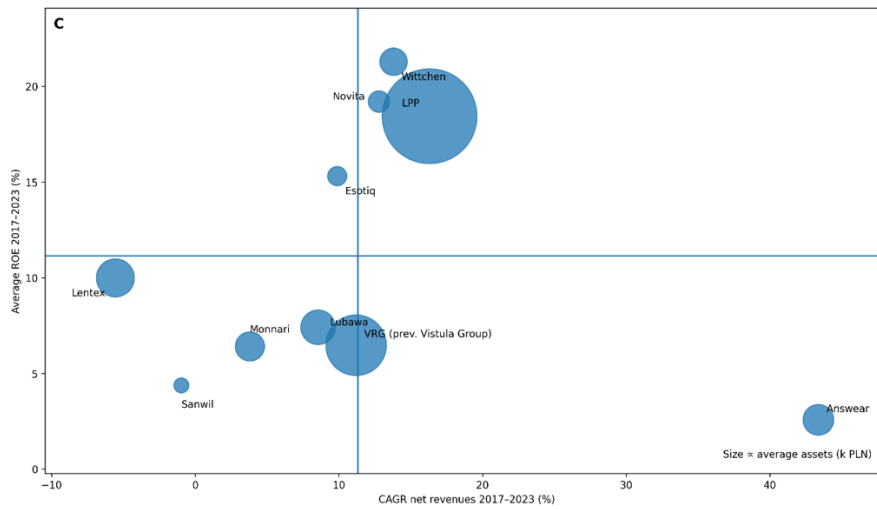


Figure 3. Strategic growth–profitability map with bubbles (size-average assets).

Source: own elaboration based on the data from the indicated financial portals or the companies' yearly reports.

Two contrasting profiles are particularly informative. Answer is an extreme “high-growth/low-profitability” case: it records by far the highest revenue CAGR (around the mid-40% range), yet its average ROE remains clearly below the sample mean (low single digits). This configuration suggests that growth was achieved with limited conversion into shareholder returns over the period, consistent with a strategy centered on rapid scaling and reinvestment rather than ROE maximization.

In contrast, Wittchen combines above-average growth with the highest average ROE in the sample (above 20%), positioning it as a “high-growth/high-profitability” performer, i.e., a firm able to expand while sustaining strong returns to equity. Scale adds an essential layer to these interpretations. LPP, the largest bubble by a wide margin, lies in the high-growth/high-ROE area (both above the averages), meaning that the firm's performance is not only strong in relative terms but also disproportionately relevant for sector aggregates due to its asset base. Conversely, firms such as Sanwil and Monnari fall below the average ROE line and exhibit modest-to-low growth, indicating weaker overall positioning across the two dimensions, albeit with much smaller asset weights. The figure therefore helps separate “economically dominant” drivers of sector performance (notably LPP) from smaller firms whose trajectories, while informative, are less influential for aggregate outcomes.

The findings of the fixed-effects panel contrast by company and by year provide evidence consistent with RQ3, in the sense that the recovery trajectories observed are compatible with better relative performance by firms that, according to their public communications, strengthened their digital channel and omnichannel approach during the pandemic. The aforementioned points are shown in Table 1.

Table 1. Post-pandemic recovery and digital orientation: effect sizes and significance (DiD/fixed effects-cluster SE).

Sample	Specification	Outcome	Estimate (cluster SE)	p-value	N (obs)	N (firms)
Online sellers only (N=6)	HighDigital × Post (median split)	ROA	0.013 (0.021)	0.543	42	6
Online sellers only (N=6)	HighDigital × Post (median split)	ROE	-0.001 (0.063)	0.982	42	6
Online sellers only (N=6)	HighDigital × Post (median split)	asinh(Net Profit)	1.315 (3.771)	0.727	42	6
Online sellers only (N=6)	HighDigital × Post (median split)	ln(Net Revenues)	0.356 (0.354)	0.314	42	6
All firms (N=10)	OnlineSeller × Post (dummy)	ROA	0.014 (0.013)	0.298	70	10
All firms (N=10)	OnlineSeller × Post (dummy)	ROE	0.067 (0.033)	0.0404	70	10
All firms (N=10)	OnlineSeller × Post (dummy)	asinh(Net Profit)	3.706 (2.028)	0.0676	70	10

Sample	Specification	Outcome	Estimate (cluster SE)	p-value	N (obs)	N (firms)
All firms (N=10)	OnlineSeller $\times$ Post (dummy)	ln(Net Revenues)	0.345 (0.259)	0.183	70	10
All firms (N=10)	PreAvgOnlineShare/10 $\times$ Post (continuous)	ROA	0.004 (0.001)	2.63e-05	70	10
All firms (N=10)	PreAvgOnlineShare/10 $\times$ Post (continuous)	ROE	0.014 (0.002)	3.8e-13	70	10
All firms (N=10)	PreAvgOnlineShare/10 $\times$ Post (continuous)	asinh(Net Profit)	0.799 (0.120)	2.42e-11	70	10
All firms (N=10)	PreAvgOnlineShare/10 $\times$ Post (continuous)	ln(Net Revenues)	0.111 (0.014)	1.33e-14	70	10

Source: own elaboration based on the data from the indicated financial portals or the companies' yearly reports.

Firstly, a comparison of companies with online sales and predominantly B2B companies reveals a statistically significant positive difference in return on equity (ROE) during the 2021–2023 period, with an approximate difference of +6.7 percentage points. With regard to revenue and profit, the estimated difference is also positive, although it does not reach statistical significance with this dichotomous partition. This suggests that heterogeneity within the "online" group may be relevant. Secondly, when digitization is measured continuously by the intensity of the online channel prior to the pandemic (percentage of online sales over total sales), the results are clearer: a 10 percentage point increase in this intensity is associated, in 2021–2023, with an additional increase of around 11.7% in revenue (in logarithmic terms), along with significant improvements in profit and profitability indicators (ROA and ROE). This pattern is consistent with the hypothesis that accumulated digital capabilities and online channel traction contributed to accelerating the recovery after the 2020 shock.

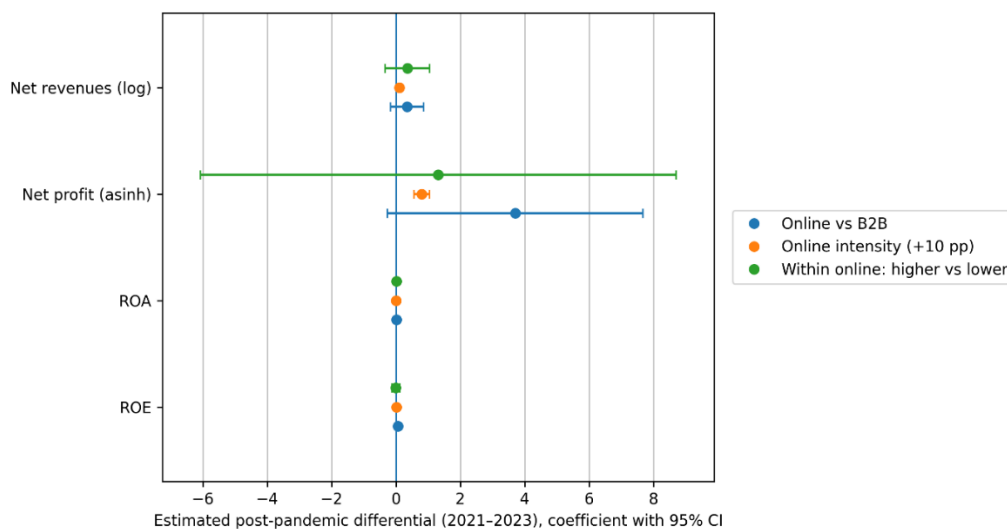


Figure 4. Recovery associated with digitization and omnichannel retailing (DiD with fixed effects, 2021–2023).

Source: own elaboration based on the data from the indicated financial portals or the companies' yearly reports.

The findings of the fixed-effects panel comparison by company and by year are consistent with RQ3, insofar as the observed recovery trajectories (2021–2023) are compatible with the relatively superior performance of firms that intensified their digital and omnichannel orientation during the pandemic, as suggested by their public communications. This assertion is corroborated by the data presented on tables of dataset included in data availability section. A comparison was made between companies with online sales and predominantly B2B companies. This comparison revealed a positive and statistically significant differential in return on equity (ROE) for the years 2021–2023, amounting to approximately +6.7 percentage points. With regard to revenue and profit, the sign is equally positive, but the evidence is less conclusive with this dichotomous classification, suggesting that

channel intensity (and not just its presence) may be the decisive factor. It is evident that the operationalization of digitization on a continuous basis, as evidenced by pre-pandemic online channel intensity (percentage of online sales over total sales), yields more robust results. Specifically, a 10-percentage point increase in that intensity is associated, in 2021–2023, with an additional increase of approximately 11.7% in revenue (measured in logarithms), and with statistically significant improvements in profit and profitability indicators (ROA and ROE). This pattern is consistent with a mechanism of resilience and demand capture derived from accumulated digital capabilities, as well as greater commercial flexibility (e.g. reallocation of sales to e-commerce and online-store coordination) following the shock of 2020.

As illustrated in Figure 5, the results of the non-parametric Mann-Whitney test were applied to "rebound" indicators.

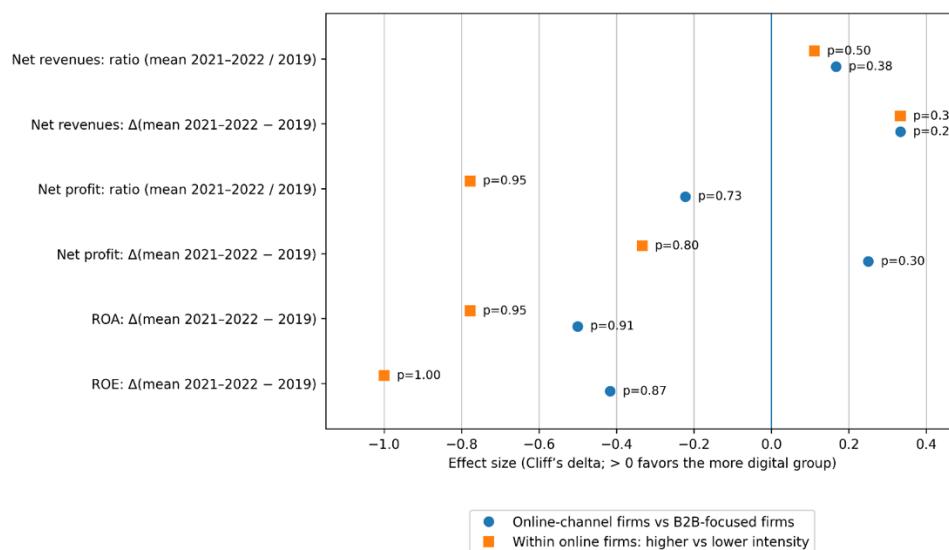


Figure 5. Post-pandemic recovery and digital orientation: effect sizes and significance (Mann-Whitney Test).

Source: own elaboration based on the data from the indicated financial portals or the companies' yearly reports.

These indicators were defined as the difference between the 2021–2022 and 2019 averages, and as 2021–2022/2019 ratios for revenue and profits. The horizontal axis indicates the effect size (Cliff delta), with positive values denoting a significantly greater recovery in the group with greater digital orientation. Furthermore, the significance value of the one-tailed test is indicated adjacent to each point. The significance values are elevated for virtually all indicators and partitions, indicating that the "rebound" distributions do not differ significantly between groups. However, a moderately favorable pattern emerges in relation to revenue, associated with digital orientation (positive effect sizes). Nevertheless, in terms of profitability (ROA and ROE), effect sizes tend to be negative when comparing intensity between firms with online channels. The recovery is consistent with the commercial benefits associated with the digital channel in some cases.

4. Discussion

This study examined the financial resilience of ten companies in the textile and clothing sector listed on the Warsaw Stock Exchange (GPW) throughout the pre-pandemic cycle (2017–2019), shock (2020), and recovery (2021–2023). The objective has been to analyse, through annual and cumulative comparisons, the evolution of net income, net profit, assets, equity, and profitability ratios (ROA and ROE), as well as to describe the heterogeneity between business models. Additionally, we analyse whether post-COVID trajectories are descriptively consistent with a greater digital/omnichannel orientation, operationalized with public disclosures and online sales intensity.

Regarding RQ1, the results confirm that 2020 constitutes the main structural break in the cycle analysed: at the aggregate level, net sales for the group of companies fell by more than 17% year-on-year, accompanied by a generalized compression of profits (albeit with varying intensity) and signs of tension in capital dynamics. This pattern fits with sectoral evidence describing a sharp contraction in the European textile and apparel industry in 2020, particularly acute in segments exposed to discretionary consumption and physical retail, and with greater relative resilience in branches linked to nonwovens/medical applications (Euratex, 2020, 2021). The aggregate recovery in 2021 - 2022 is intense (total revenue growth of close to 39% in 2021 and >37% in 2022), but it does not eliminate heterogeneity, and a clear slowdown is observed in 2023 (total revenue growth of 9%). Interpretatively, this sequence is consistent with a post-lockdown and reopening “rebound” phase, followed by a less expansive normalization; this profile is consistent with the literature that emphasizes that financial resilience is not only defined by “returning” to previous levels, but by the ability to absorb, maintain operations, and stabilize in highly uncertain environments (Salignac et al., 2019; Zahedi et al., 2021). The profitability analysis reinforces this reading: the observed range is narrower in ROA (from -10.4% to 25.4%) than in ROE (from -32.5% to 40.3%), suggesting an amplification via capital structure (return to shareholders fluctuates more than return on assets). Emblematic cases illustrate the mechanics: LPP recorded negative returns in 2020 (ROA -1.8%; ROE -6.2%) and an extraordinary rebound in 2021 (ROE 40.3% vs. ROA 10.6%), while Wittchen approaches a relatively stable high-performance profile with peaks in 2022 (ROA ~19.1%; ROE ~29.3%). These contrasts are consistent with approaches that interpret resilience as a result of resources and management decisions (e.g., operational and financial adjustment), rather than as a uniform property of the sector (Salignac et al., 2019).

With regard to RQ2, the results show that sector aggregates mask radically different trajectories. In 2020, the largest declines in revenue are concentrated in retail/fashion-oriented companies: Wittchen and Monnari exceed -25%, while VRG and LPP fall more than -20%. In contrast, there are temporary “winners” linked to materials/protection and healthcare demand: Novita increased its revenues by >80% and Sanwil by >67% during 2020. This asymmetry is consistent with the literature documenting simultaneous but uneven effects across subsectors (fashion vs. nonwovens/healthcare) and the need for rapid reconfiguration of production and logistics in disrupted textile chains (Seidu et al., 2024; Zhao & Kim, 2021). In the recovery phase, heterogeneity in persistence is also observed: some expansions during the pandemic period are reversed (subsequent declines in Sanwil and Lentex), while other companies consolidate levels above 2017 after the rebound (e.g., LPP and Wittchen). Answer's trajectory stands out for its structural expansion: on the 2017=100 index, it reaches a level close to 870 in 2023 (cumulative growth of +768%), suggesting sustained scaling rather than a temporary rebound. Over the entire 2017 - 2023 horizon, total revenues increase by >135% (for comparable firms), driven disproportionately by Answer, with also high increases in LPP (>147%) and Wittchen (>117%). This pattern is consistent with studies that emphasize that performance during shocks depends on firm characteristics (profile, exposure to retail, etc.) and that differences can be substantial even within the same sector (Cho & Saki, 2021; Santos & Castanho, 2022). The growth-profitability “strategy” sums up this heterogeneity well: Answer appears as a case of high growth and low average profitability (average ROE below average), while Wittchen combines above-average growth with the highest average ROE (>20%). LPP also has the largest weighting by assets, so its positioning (high growth and above-average ROE) has disproportionate relevance for any aggregate reading. In interpretive terms, these results are consistent with the idea that resilience and recovery do not depend solely on the rebound in demand, but also on adjustment capabilities and strategic/financial decisions that shape the conversion of growth into returns (Salignac et al., 2019; Ozdemir et al., 2022).

Finally, with regard to RQ3, the evidence supports a nuanced interpretation: there are signs consistent with a positive association between digital orientation and recovery, but this is not uniform depending on the digitization metric and the contrast applied. In the “online vs. predominantly B2B”

comparison, a positive and statistically significant difference in ROE of approximately +6.7 p.p. is identified for 2021–2023, while in revenue and profit the differences remain positive but do not reach significance with this dichotomous partition. This is consistent with an interpretation in which the presence of the online channel is not sufficient to guarantee broad improvements in all metrics, and where heterogeneity within the “online” group is decisive. When digitization is operationalized as the continuous intensity of the online channel prior to the pandemic, the results are clearer: a 10 p.p. increase in this intensity is associated with an additional increase of 11.7% in revenue (in logarithms) in 2021–2023 and with significant improvements in profit, ROA, and ROE. This pattern is consistent with the literature linking greater digital capabilities/investments with smaller declines and greater adjustment capacity during COVID-19, albeit with heterogeneity depending on the degree of adoption (Abidi et al., 2023; Li et al., 2022), and with evidence in fashion/retail on the acceleration of channel integration and digital transformation in response to mobility restrictions (Acquila-Natale et al., 2022; Wulff, 2022). However, the nonparametric (Mann–Whitney) contrast on synthetic “rebound” indicators suggests caution: for most outcomes and partitions, the p-values are high (no statistically clear differences), with a moderately favourable pattern observed in revenue (positive effect sizes), but not necessarily in profitability when comparing intensity within the online subgroup (effect sizes tending to be negative in ROA/ROE in that partition). Overall, the most parsimonious reading is that the evidence is descriptively compatible with a role for the digital channel in sustaining/recovering sales, but that the translation into profitability depends on additional conditions (costs, financial structure, competitive dynamics), which is consistent with approaches that understand digitalization as a potential, but not automatic, mechanism of resilience (Akhtar et al., 2022; Xia et al., 2022) and with the methodological caution noted by the design itself.

In line with the central contribution of the article, this study provides an overall assessment of the financial resilience and post-pandemic recovery of GPW-listed Polish textile and clothing firms throughout the 2017 - 2023 period. The study details the asymmetry of impacts and the relevance of the business model and adds an explicit approach to the digital/omnichannel dimension using a DiD approach with fixed effects and non-parametric contrasts, positioning its findings with consistency. However, the study has a number of limitations that should be noted. (i) The small sample size (10 firms) and its bias toward listed companies; (ii) the possible presence of survival bias; (iii) the possibility of residual endogeneity in the digital-orientation measures, since firms with stronger pre-existing capabilities may have been more likely both to invest in e-commerce and to recover faster; (iv) the measurement of digitization based on online sales intensity, which is susceptible to error and not equivalent to a broad digital transformation; and (v) the sensitivity of ROE to changes in equity and financial structure in years of high volatility. Accordingly, the findings should be interpreted as applying primarily to the population studied: Polish textile and clothing firms listed on the Warsaw Stock Exchange. They should not be generalized automatically to unlisted SMEs, which are not represented in the sample, or to firms in other industries, where business models, exposure to physical retail, and crisis-response mechanisms may differ. The results may offer useful indications for understanding resilience in related settings, but their external validity beyond listed textile and clothing firms requires further empirical testing.

Future research could test the external validity of these findings by expanding the universe to unlisted SMEs, integrating direct and multidimensional measures of digitization, and examining whether similar recovery patterns emerge in other industries. It would also be relevant to contrast mechanisms with stronger causal identification strategies and extend the time window to assess the persistence (or reversal) of the effects observed after 2023.

For companies in the sector, the results suggest that resilience to systemic shocks is not a homogeneous attribute, but rather the product of positioning, channel, and reconfiguration capacity. First, the magnitude of the decline in 2020 is concentrated in profiles exposed to physical retail, reinforcing the value of strategies that enable sales to be sustained under restrictions (e-commerce and omnichannel coordination). Second, quantitative evidence associates greater pre-COVID online

intensity with a stronger commercial recovery in 2021–2023, pointing to the importance of building digital traction before the crisis, not just reacting during it. Third, the greater dispersion in ROE than in ROA underscores that shareholder recovery depends critically on capital structure: decisions on leverage, equity preservation, and cost discipline condition the conversion of the rebound into profitability. Finally, the existence of temporary beneficiaries linked to healthcare demand suggests that portfolio diversification and production flexibility can act as partial hedges against demand disruptions.

Conclusions

An analysis of ten textile and apparel companies listed on the Warsaw Stock Exchange from 2017 to 2023 reveals that 2020 marked a critical juncture in the examined period. This year witnessed an aggregate contraction in net sales exceeding 17%, accompanied by a pervasive decline in profits, albeit with notable variations in intensity among individual companies. In 2021 and 2022, there was a marked aggregate rebound in revenues. However, in 2023, the recovery lost momentum, suggesting a less uniform subsequent normalization. Profitability demonstrates heightened volatility in return on equity relative to return on assets, suggesting that the financial structure amplifies fluctuations in shareholder performance. The findings indicate significant heterogeneity across business profiles. Companies with a strong presence in consumption and physical stores experienced substantial declines, while those engaged in the healthcare sector demonstrated remarkable growth in 2020, often of a temporary nature. In the long term, aggregate growth is strongly influenced by cases of structural expansion, notably the trajectory of Answear and, to a lesser extent, LPP and Wittchen. In the context of digital transformation, the observed disparities indicate a favourable correlation with the recovery phase. Specifically, enterprises that have established an online sales channel demonstrate higher returns on equity (ROE) during the 2021–2023 period. Furthermore, upon examining the extent of their prior digital engagement, substantial enhancements in revenue, profit, and profitability are evident. However, it is imperative to exercise caution when employing non-parametric tests, as they underscore the notion that the correlation between digitization and financial gain is not inevitable. Instead, this relationship is contingent upon factors such as costs, competitive pressures, and financial decisions. The sector's resilience is not uniform; it is contingent upon the business model, the capacity to adapt the offering, and prior preparation in digital channels and financial management.

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Appendix A

Table A.1 Profile of the companies analyzed.

Company	Description of business/main activity	Products/markets	History/presence
Wittchen	Family-owned manufacturing and retail company.	Leather and textile products: jackets, footwear, bags, wallets, and accessories.	Family company profile with a presence in retail.
Vistula Group (VRG)	Multi-brand corporation.	It includes Polish fashion brands: Vistula, Wólczanka, Bytom, Deni Cler; and a jewelry brand (W. Kruk).	Group with a portfolio of established brands.
Sanwil	Manufacturer of specialized textile materials.	Textiles for upholstery, medical applications, PPE, technical materials, and the footwear sector.	Focus on technical materials and industrial uses.
Novita	Nonwoven fabric manufacturer.	Spunlace and needle-punched nonwovens for personal hygiene, medical, household, and technical applications.	Specialization in nonwovens for multiple uses.
Monnari	Polish women's fashion brand.	Wide range of products for women.	Focus on apparel/retail (brand).
Lubawa	Manufacturer of textile products for uniformed services.	PPE, tents, airsheds, fabrics, specialized vehicle equipment, and camouflage.	Focus on institutional clients/defense-security.
LPP	Large Polish company (listed on the WIG20 index).	Clothing and accessories under five brands: Reserved, Cropp, House, Mohito, Sinsay.	Large-scale group with multiple brands.
Lentex	Polish manufacturer of nonwoven fabrics.	Nonwovens (spunlace, thermobond, needle-punched) for automotive, sanitary, furniture, clothing, and filtration.	Company with over 100 years of activity.
Esotiq & Henderson	Producer/marketer with physical stores and online channel.	Lingerie, swimwear, and clothing.	Mixed brick-and-mortar + e-commerce model.
Answear	International e-commerce (online store).	Online sales of multiple brands of clothing, footwear, accessories, and home furnishings.	Presence in 12 countries.

Source: own elaboration based on the data from the indicated financial portals or the companies' yearly reports.

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The Role of Collective Intelligence in Fostering Green Innovation: The Mediation Effect of Corporate Social Responsibility

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Abstract

Green innovation has become a primary driver for the development of entrepreneurial ecosystems. While collective intelligence, corporate social responsibility, and green innovation have been studied individually, integrated theoretical models remain limited. This study has two main objectives. First, it examines the direct effect of collective intelligence on green innovation. Second, it also examines the indirect effect of collective intelligence on green innovation by focusing on the mediating role of corporate social responsibility in this relationship. The research adopted a quantitative research design via a survey conducted among 745 Tunisian firms. The data collected were analysed using structural equation modelling (SEM) by means of AMOS version 23 software to test the relationships between the integrated variables in the research conceptual model. A re-tested scale was adopted in the study based on a literature review. The convergent and discriminant validity as well as Cronbach's alpha were tested and ensured that they met the requisite standard. A structural model was developed to confirm the abovementioned relationships. The quantitative results demonstrate that collective intelligence has a significant and positive effect on green innovation. Specifically, the study confirms that corporate social responsibility plays a partial mediating role in this relationship. Four key findings emerge: first, collective intelligence directly fosters innovative green practices; second, the interaction between collective intelligence and social responsibility strengthens firm outcomes; third, shared decision-making and knowledge exchange are vital capabilities; and fourth, the partial mediation highlights that social responsibility acts as a strategic bridge for sustainable initiatives. This study provides empirical evidence encouraging firms to invest in collective intelligence and capability development. The findings indicate that embedding corporate social responsibility into corporate strategy enhances the impact of green innovation. Ultimately, this integration supports genuinely sustainable decision-making processes within the Tunisian business context. Therefore, both theoretical and practical implications were suggested.

Key words

collective intelligence, corporate social responsibility, green innovation, Tunisian firms, corporate strategy, strategic decision making.

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Introduction

In today's context, shaped by climate change, industrial development, pollution, biodiversity loss, and growing consumer awareness of environmental issues, firms have been compelled to adopt environmentally responsible practices. Faced with these pressures, firms have turned to green innovation as a vital strategy, enabling them to ensure their long-term survival while sustaining a competitive advantage. Research by Wang et al. (2021) demonstrates that implementing green innovation fosters sustainable development and conserves resources by producing environmentally responsible goods and services. Moreover, studies (Fei et al., 2016; Karimi Takalo et al., 2021) indicate that green innovation is no longer confined to product design or manufacturing; it also extends to

sourcing and marketing, thereby broadening its contribution to environmental sustainability. Beyond this expansion, green innovation often requires profound organisational transformation, fostering exchange, knowledge sharing, and the pooling of collaborative efforts. Central to this process is collective intelligence, defined as the collaborative and creative interaction that allows groups to mobilise the knowledge (Weschsler, 1971), skills, and ideas essential for responsible action and innovation (Lévy, 1997; Malone & Bernstein, 2015).

The importance of collective intelligence is increasingly acknowledged. It enables organisations to better understand and analyse stakeholder expectations and to identify the most effective solutions to social and environmental challenges (Weschsler, 1971). In this way, collective intelligence serves as a key driver of corporate social responsibility.

Recognising the importance of a robust theoretical framework for addressing this research objective, this study draws on the Knowledge-Based View (KBV) proposed by Grant (1996). This perspective posits that knowledge is a strategic resource and a source of sustainable competitive advantage (Del Giudice & Maggioni, 2014). The works of Nonaka and Takeuchi (1995), Spender (1996), and Kogut and Zander (1992) underscore the critical role of exploring, developing, and sharing knowledge in implementing sustainable innovation practices within firms. Building on this perspective, Sassi et al. (2022) demonstrated that collective intelligence is a key strategic resource that allows firms to optimise knowledge transformation processes and mobilise collective efforts toward innovative and sustainable solutions. Moreover, the interaction between collective intelligence and corporate social responsibility (CSR) promotes knowledge creation and sharing, facilitating the emergence of green and socially responsible innovations (Nonaka & Takeuchi, 1995; Del Giudice & Maggioni, 2014). However, research examining the simultaneous relationships among these three variables remains limited (Shahzad et al., 2020; Feifei et al., 2022; Liao et al., 2022).

The present study seeks to answer the following research question: To what extent does collective intelligence influence green innovation through CSR in industrial firms? To address this question, we first present the theoretical framework of collective intelligence, green innovation, and social responsibility, emphasising the direct and indirect relationships among these concepts. We then outline the results of a survey conducted with 745 Tunisian industrial firms. Finally, we discuss the main findings and highlight the theoretical, practical, and managerial implications, as well as the study's limitations and directions for future research.

1. Literature review

1.1. *The relationship between collective intelligence and green innovation*

Environmental issues now play a central role in corporate strategies, reflecting a growing awareness of their importance. Protecting the environment, reducing pollution, and optimising resources have become priorities for organisations. They are thus seeking to enhance their performance and differentiate themselves in an increasingly competitive market (Cisneros Chavira et al., 2023). This evolution is not occurring in isolation; it is part of a context in which stakeholder expectations, whether regulatory, economic, or societal, are pushing firms to integrate more sustainable practices into their operations. Faced with these challenges, green innovation appears to be an essential driver for initiating the necessary transformations. It is a strategic response to new environmental requirements. Many researchers (Kneipp et al., 2019; Soewarno et al., 2019; Szutowski, 2021) emphasise its crucial role in the competitiveness and growth of firms. In fact, green innovation not only enables firms to respond to current and future environmental challenges but also creates new development opportunities. It also helps strengthen organisations' competitive positioning (Severo et al., 2017; Kneipp et al., 2019).

Extensive literature further underscores the multifaceted nature of green innovation. According to Kemp and Pontoglio (2007), green innovation encompasses products, production processes, services, management methods, and business models that, throughout their life cycle, mitigate environmental risks, pollution, and resource-related impacts, including energy consumption. This broad definition

is further developed by Eiadat et al. (2008), who describe green innovations as initiatives aimed at preventing pollution, reducing waste, and adopting environmental management practices. Other researchers stress its collaborative dimension. Karimi Takalo et al. (2021), for instance, argue that such innovation depends on firms' ability to mobilise external knowledge and collaborate with diverse stakeholders to develop solutions that are both sustainable and competitive. For their part, Chen et al. (2006) offer an even broader perspective, encompassing both tangible and intangible aspects, to minimise the environmental footprint of products and processes. Bekk et al. (2016) add that this approach is often driven by strict regulations or growing demand for environmentally friendly products.

These varied approaches demonstrate that green innovation is not limited to technological or strategic choices but also relies on collaborative dynamics and knowledge sharing.

Green innovation is largely influenced by collective intelligence, understood as a group's ability to collaborate, share knowledge, and generate innovative solutions. In this context, the work of Lee and Jin (2019) highlighted the decisive role of collective intelligence in enhancing innovation processes within firms. They showed that in environments where collective intelligence is highly developed, creativity, the pursuit of innovative solutions, and organisational dynamics are significantly strengthened. Similarly, Boder (2006) argues that collective intelligence drives knowledge development, which in turn fosters creativity and innovative solutions that enable firms to address the challenges they face. Thus, firms continually seek development paths that balance environmental responsibility and competitiveness. According to Engel et al. (2014) and Woolley et al. (2015), this goal can only be achieved through collective intelligence, which is considered an essential driver of green innovation advancement. Indeed, collective intelligence promotes joint decision-making and knowledge sharing, reducing individual biases and fostering innovative, sustainable ideas to address complex development challenges (Lee & Jin, 2019). In summary, collective intelligence drives green innovation by fostering knowledge sharing, creativity, and organisational dynamics that promote the implementation of new, environmentally friendly practices. Hence, the first hypothesis of this study is:

H1: Collective intelligence has a significant positive effect on green innovation.

1.2. The relationship between collective intelligence and corporate social responsibility

The concept of corporate social responsibility (CSR) has attracted growing attention in the literature in recent years (Freeman and McVea, 2001; Kolk, 2016; Vilanova et al., 2009; Carroll, 1991; Garriga & Melé, 2004; Lee & Shin, 2010; Maignan, 2001). CSR encompasses all efforts a firm undertakes to protect the environment and meet the expectations of its stakeholders, thereby enhancing its reputation and legitimacy (Asrar-ul-Haq et al., 2017; Lee, 2020; Guo et al., 2022; Yun et al., 2019).

CSR should not be seen merely as an organisational stance. It is a comprehensive strategy built on collaboration, knowledge sharing, and organisational learning. In this context, collective intelligence plays a central role, enabling the identification of social and environmental issues with greater precision and stimulating synergy and interaction among employees. Notably, studies by Lee and Jin (2019) and Zhang (2024) demonstrate that these dynamics promote responsible behaviour, making collective intelligence a crucial driver for the success and sustainability of CSR practices. Accordingly, we formulate the second hypothesis of this study:

H2: Collective intelligence has a significant positive effect on corporate social responsibility.

1.3. The relationship between corporate social responsibility and green innovation

Corporate social responsibility (CSR) is a key driver of green innovation, serving as a catalyst for the adoption of sustainable and environmentally friendly practices. As highlighted by Naveed et al. (2023), firms engaged in CSR initiatives incorporate environmental and social concerns into their overall strategy, which in turn encourages them to explore innovative solutions to address ecological challenges. CSR is not limited to regulatory compliance. Instead, it embodies a profound transformation of business models, aiming to reconcile economic performance, social well-being, and

environmental preservation (Aguilera-Caracuel & Ortiz-de-Mandojana, 2013). This holistic approach prompts firms to reassess their processes, adopt clean technologies, and develop eco-friendly products and services, while meeting the increasing expectations of stakeholders, including customers, investors, employees, and local communities.

One of the key mechanisms through which CSR influences green innovation is its capacity to create strategic alignment between economic objectives and environmental imperatives. For instance, firms committed to reducing their carbon footprint or preserving biodiversity are often driven to invest in green technologies, optimize supply chains, and rethink production models (Aguilera-Caracuel & Ortiz-de-Mandojana, 2013). These initiatives, while motivated by ethical and regulatory considerations, also yield tangible competitive advantages. Firms that embed CSR into their strategy can strengthen brand image, build loyalty among environmentally conscious customers, and attract investors seeking sustainable opportunities (Karimi Takalo et al., 2021). As a result, CSR does not merely respond to external pressures; it becomes a strategic driver of green innovation and the creation of long-term value.

Moreover, CSR promotes responsible resource management, which is fundamental to the development of green innovation. By encouraging more efficient use of raw materials, reducing waste, and optimising production processes, CSR enables firms to minimise their environmental impact while enhancing economic performance (Feifei et al., 2022; Novitasari & Tarigan, 2022). For instance, a firm adopting CSR practices may implement recycling systems, reduce energy consumption, or design products with a lower environmental impact. Such initiatives extend beyond technical improvements; they entail a cultural transformation within the organisation, where employees and managers are encouraged to adopt more responsible and innovative behaviours that address environmental challenges and create value (Alauddin, 2023; Chen & Jin, 2023; Dzage et al., 2024). Furthermore, Wang et al. (2024) conducted a meta-analysis of 208,297 observations from 48 empirical studies and confirmed the significant effect of CSR on green innovation. Their findings indicate that this effect is particularly pronounced in SMEs and stronger in Western contexts than in Eastern ones. Building on this work, a meta-analysis by Gürler (2024) of 29 articles also confirmed a significant link between CSR and green innovation across sectors. This study further revealed an interesting regional comparison: the effect of CSR on green innovation is more significant in North America than in Europe. This divergence can be attributed to differences in organisational culture, institutional regulations, and market maturity between the two regions. Similarly, Hong et al. (2020) demonstrated that Chinese firms sharing their CSR practices benefit from new environmentally friendly innovations. Overall, CSR is a cornerstone of green innovation, creating a virtuous cycle in which responsible initiatives spark innovation that, in turn, strengthens corporate competitiveness and sustainability. Hence, the third hypothesis of this study:

H3: CSR has a significant positive effect on green innovation.

1.4. The mediating effect of corporate social responsibility between collective intelligence and green innovation

The preceding sections underscored the direct relationships among collective intelligence and green innovation, collective intelligence and social responsibility, and social responsibility and green innovation. However, current research rarely examines these three dimensions together, especially the mediating role of CSR in the relationship between collective intelligence and green innovation. Ji et al. (2019), however, emphasised the mediating role of government support in the relationship between green innovation and corporate social responsibility, drawing on panel data collected in China between 2008 and 2016.

Padilla-Lozano and Collazzo (2022) further examined the relationship between green innovation, social responsibility, and competitiveness. His findings suggest that CSR and innovation have a significant and positive impact on the competitiveness of industrial firms, particularly in developing economies.

Building on these studies, we previously analysed the link between corporate social responsibility and green innovation. We underscored that embedding green innovation within corporate strategies not only optimises production processes but also secures a lasting competitive advantage. Similarly, Bastien Scheid, CSR manager at the French group SCORUS, a firm specialising in transforming HR, finance, and information technology functions, provided additional insights in our study. The author emphasises the undeniable role of collective intelligence in generating innovative, environmentally sustainable value through the development of corporate social responsibility practices in French firms. In addition, study by Yun et al. (2019) demonstrate that firm value is increasingly associated with their commitment to CSR activities. Their findings reveal that collaboration, active employee engagement, and participation in the development of corporate strategies facilitate the identification of environmental and social issues (key determinants of CSR), thereby stimulating innovative solutions that align corporate objectives with broader environmental and social expectations. Accordingly, we formulate our fourth working hypothesis:

H4: CSR plays a mediating role in the relationship between collective intelligence and green innovation.

Figure 1 summarises all the hypotheses presented above.

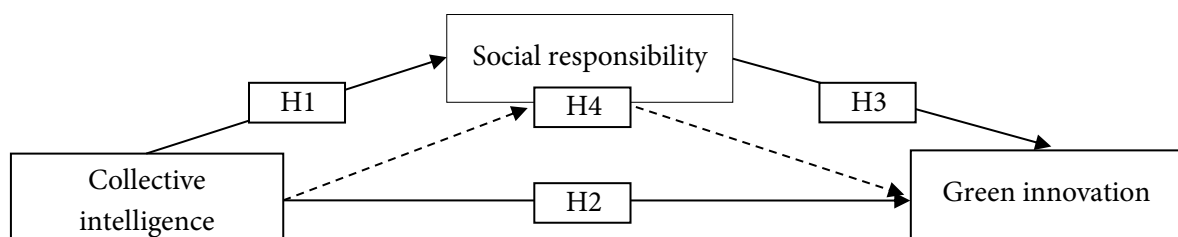


Figure 1. Conceptual model.

Source: Own elaboration.

2. Methodology

2.1. Sampling and data collection method

To examine the effect of collective intelligence on green innovation through CSR, a quantitative study was conducted using structural equation modelling (SEM) with AMOS 23. The study involved 745 industrial firms in Tunisia, which was selected as the research context due to its ongoing efforts to promote sustainable development practices that combine green innovation with CSR. Previous studies indicate that sharing green values and corporate engagement improve firm performance, particularly environmental performance (Amin, 2024; Aouay et al., 2023). Karra (2021) emphasised that the competitiveness of Tunisian firms depends on their willingness to adopt environmentally responsible strategies. The sample was determined using a non-probabilistic quota sampling method. This approach was designed to reflect the population's characteristics and ensure representation across all industrial sectors. According to the National Business Register (Répertoire National des Entreprises, RNE), Tunisia has 93,577 industrial firms. Table 1 presents the distribution of the population and study sample by sector.

Table 1. Distribution of Tunisian industrial firms by sector.

Sector of Activity	Percentage	Population	Sample Size
Textile and Clothing	19.7%	18,398	147
Agri-food	19.2%	17,934	143
Metallurgy and Metal Products	15.3%	14,344	114
Mechanical and Electrical Industries	18.4%	17,160	137
Chemical and Pharmaceutical Industries	11.4%	10,725	85
Construction Materials, Glass, and Ceramics	9.1%	8,580	68
Other Industries (wood, paper, plastics, etc.)	6.8%	6,336	51
Total	100%	93,577	745

Source: Own elaboration.

Data were collected using two methods. First, face-to-face interviews at the 12th Riyadh Trade Fair in Tunis (29–30 January 2025). Second, door-to-door surveys of firms in major cities, including Tunis, Nabeul, Bizerte, Sfax, and Sousse. Senior managers and executives were targeted. This ensured that responses reflected a thorough understanding of the concepts studied.

2.2. Measurement scales and questionnaire

This study aims to investigate the influence of collective intelligence on green innovation through CSR in industrial firms, using a quantitative questionnaire. The first part of the questionnaire includes general information about the respondents, such as the firm they work for, their position, and their length of service. The second part of the questionnaire includes measurement scales for the different variables in our study. All these scales have been tested and validated to ensure the relevance of the results.

To measure collective intelligence, we selected a 17-item scale divided into four dimensions: coordination, networking, diversity, and independence. This scale was developed by Kaur and Shah (2018) and tested and validated using structural equation modelling with 600 industrial firms in various fields. To measure corporate social responsibility, we chose the scale developed by Reverte et al. (2016), which adopts a holistic approach, the "Triple Bottom Line," that considers three dimensions: economic, social, and environmental (Asiaei et al., 2021). This scale comprises 27 items, classified into three dimensions. However, in this study, we have adopted the second-order model, as mentioned in the work of Asiaei et al., (2023), due to the strong correlation between the three dimensions: economic, social, and environmental. To measure green innovation, we adopted the scale developed by Li et al. (2024), inspired by the work of Chang and Chen (2013) and Chen et al. (2006). This scale comprises 10 items related to energy conservation, waste recycling, and pollution prevention.

3. Research results

To analyse the data collected from the questionnaire administered to a sample of 745 industrial firms, we employed a two-step analytical approach. The first step was exploratory, aimed at verifying the validity of the measurement scales. We applied principal component analysis (PCA) followed by an internal consistency assessment. Figure 2 presents the results of the first-order factor analysis.

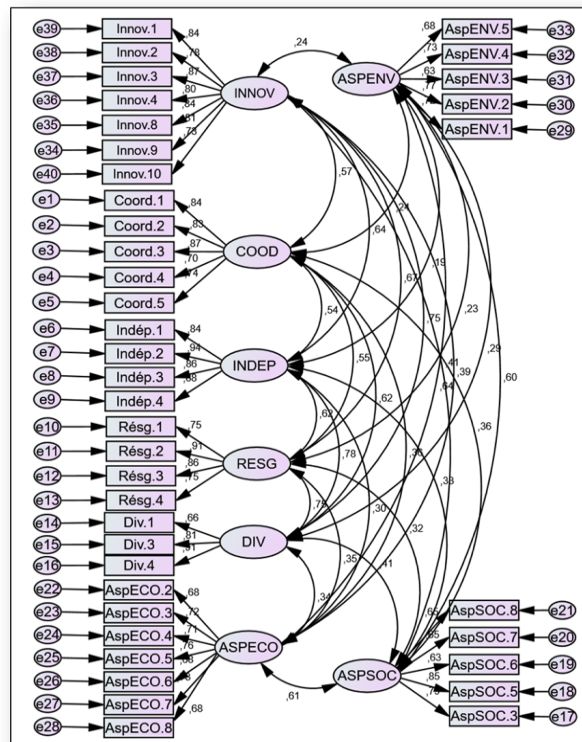


Figure 2. First-order model.
Source: Own elaboration.

The second step was confirmatory and conducted using structural equation modelling with AMOS 23 software. This stage enabled us to validate both the research model and the proposed hypotheses.

3.1. Results of the confirmatory factor analysis

Descriptive statistics of this study are presented in Table 2. The means of respondents' answers ranged from 3.62 to 4.18, with standard deviations of 0.913 to 1.64, indicating that responses are relatively dispersed and less concentrated around the average. Table 2 shows that the χ^2/df ratio is 4,8105, which is below the threshold value of 5. The RMR and RMSEA values are both below 0.1 and close to zero. In addition, the GFI, AGFI, NFI, and CFI are all close to 1. These results indicate that the model fit is satisfactory. Thus, we can conclude that the model adjustments are quite good. We also checked whether the data distribution is balanced and normal. Therefore, skewness and kurtosis values were examined. Skewness is considered acceptable when it is below 3, and kurtosis is acceptable when it is below 8. Based on the values shown in Table 2, we can assume that the distributions of variables were adequately spread.

Table 2. Descriptive statistics.

Abbreviation	Minimum	Maximum	Mean	Std deviation	Skewness	Kurtosis
RSE						
AspECO.2	1.00	5.00	4.0209	0.93361	-0.997	1.037
AspECO.3	1.00	5.00	4.1382	0.92637	-1.473	2.561
AspECO.4	1.00	5.00	4.2047	0.97546	-1.206	1.023
AspECO.5	1.00	5.00	3.8344	0.99606	-1.245	1.604
AspECO.6	1.00	5.00	3.8435	1.10259	-0.971	0.395
AspECO.7	1.00	5.00	3.9426	1.00357	-0.926	0.624
AspECO.8	1.00	5.00	4.1173	0.97852	-1.134	0.909
AspENV.1	1.00	5.00	3.9544	1.20020	-1.257	0.684
AspENV.2	1.00	5.00	4.0574	1.08001	-1.436	1.626
AspENV.3	1.00	5.00	3.5593	1.23433	-0.652	-0.534
AspENV.4	1.00	5.00	3.7627	1.13732	-1.015	0.469
AspENV.5	1.00	5.00	3.8227	0.99993	-0.715	0.122
AspSOC.3	1.00	5.00	4.1213	0.99327	-1.575	2.536
AspSOC.5	1.00	5.00	3.9400	0.97705	-1.058	1.125
AspSOC.6	1.00	5.00	3.7445	1.15954	-0.836	0.013
AspSOC.7	1.00	5.00	3.6767	1.10412	-1.033	0.616
AspSOC.8	1.00	5.00	3.6845	1.08614	-0.887	0.320
Collective intelligence						
Coord.1	1.00	5.00	3.7705	1.15486	-1.114	0.513
Coord.2	1.00	5.00	3.7953	1.19007	-0.913	-0.099
Coord.3	1.00	5.00	3.7510	1.27408	-0.995	-0.116
Coord.4	1.00	5.00	3.6532	1.16394	-1.001	0.407
Coord.5	1.00	5.00	3.6128	1.27334	-0.976	-0.076
Div.1	1.00	5.00	3.6780	1.20240	-0.978	0.125
Div.3	1.00	5.00	3.6115	1.16645	-1.161	0.528
Div.4	1.00	5.00	3.7523	1.33781	-0.971	-0.245
Indep1	1.00	5.00	3.6180	1.25739	-0.736	-0.497
Indep2	1.00	5.00	3.5984	1.38357	-0.755	-0.676
Indep3	1.00	5.00	3.5880	1.37955	-0.600	-0.925
Indep 4	1.00	5.00	3.6545	1.26689	-1.049	-0.050
Res.1	1.00	5.00	3.4302	1.24955	-0.747	-0.349
Res.2	1.00	5.00	3.5424	1.27865	-0.807	-0.435
Res.3	1.00	5.00	3.5332	1.21291	-0.852	-0.245
Res. 4	1.00	5.00	3.5971	1.15988	-0.919	0.258
Green innovation						
Innov.1	1.00	5.00	3.6858	1.26887	-1.013	-0.021
Innov.2	1.00	5.00	3.8318	1.14560	-0.811	-0.280
Innov.3	1.00	5.0	3.6767	1.32155	-0.887	-0.326
Innov.4	1.00	5.00	3.8501	1.11233	-0.717	-0.433
Innov.8	1.00	5.00	3.8422	1.14936	-0.930	0.124
Innov.9	1.00	5.00	3.7836	1.20056	-0.871	-0.101
Innov.10	1.00	5.00	3.8462	1.06072	-0.756	-0.047

Note: Model fit: χ^2 (704, N = 745) = 3386.607 $p < 0.001$, normed χ^2 = 4.8105, RMSEA = 0.070 SRMR = 0.073, CFI = 0.957, TLI = 0.941, NFI = 0.933, IFI = 0.957, *** $p < 0.001$.

Source: Own elaboration.

3.2. Measurement of convergent and discriminant validity

To determine whether the scale items intended to measure the same construct are sufficiently related, we adopted convergent validity, assessed through the CR (which must exceed 0.7) and the AVE (which must exceed 0.5). The data presented in Table 3 indicate that convergent validity was satisfactory and met the required criteria. Furthermore, we assessed whether the square root of the AVE for each construct (items in bold in Table 3) is greater than its correlations with the other constructs. The values in Table 3 confirm discriminant validity for all variables. Furthermore, the dimensions of collective intelligence: coordination, diversity, independence, and networking, are strongly correlated. The construct is also grounded in a coherent and well-established theoretical framework (Kaur & Shah, 2018; Aubouin-Bonnaventure et al., 2025). Taken together, these elements justify treating collective intelligence as a second-order latent variable. This choice helps reflect the overall conceptual structure and the interdependence of its components. The same reasoning applies to social responsibility. Its social, environmental, and economic dimensions show strong correlations and are supported by established theoretical work (Asiaei et al., 2021; Asiaei et al., 2023). Social responsibility can therefore also be considered a second-order latent variable.

Table 3. Convergent and discriminant validity.

Factors/ items	St. Loading	CR	AVE	MSV	Ma R(H)	COORD	INDEP	RESG	DIV	ASP SOC	ASP ECO	ASP ENV	INNOV
1- Coordination ($\alpha=0.904$)		0.898	0.640	0.391	0.908	0.800							
Coord.1	0.842												
Coord.2	0.834												
Coord.3	0.865												
Coord.4	0.701												
Coord.5	0.744												
2-Independence ($\alpha=0.932$)		0.933	0.776	0.613	0.941	0.536***	0.881						
Indep.1	0.843												
Indep.2	0.936												
Indep.3	0.858												
Indep.4	0.885												
3-Networking ($\alpha=0.889$)		0.891	0.674	0.557	0.911	0.551***	0.616	0.821					
Resg.1	0.754												
Resg.2	0.909												
Resg.3	0.860												
Resg.4	0.750												
4-Diversity ($\alpha=0.839$)		0.838	0.637	0.613	0.879	0.625***	0.783	0.747	0.798				
Div.1	0.656												
Div.3	0.813												
Div.4	0.906												
5-Social aspect ($\alpha=0.855$)		0.840	0.516	0.375	0.863	0.360***	0.329	0.323	0.406	0.719			
AspSOC.3	0.788												
AspSOC.5	0.847												
AspSOC.6	0.632												
AspSOC.7	0.655												
AspSOC.8	0.646												
6-Economic aspect ($\alpha=0.883$)		0.877	0.504	0.408	0.878	0.361***	0.297	0.354	0.340	0.612	0.710		
AspECO.2	0.678												
AspECO.3	0.716												
AspECO.4	0.711												
AspECO.5	0.764												
AspECO.6	0.685												
AspECO.7	0.727												
AspECO.8	0.684												
Environmental aspect($\alpha=0.853$)		0.834	0.503	0.408	0.840	0.239***	0.194	0.230	0.289	0.605	0.639	0.709	
AspENV.1	0.718												
AspENV.2	0.775												
AspENV.3	0.634												
AspENV.4	0.733												
AspENV.5	0.677												
Innovation ($\alpha=0.853$)		0.930	0.657	0.559	0.934	0.566***	0.636	0.672	0.748	0.407	0.394***	0.244	0.810
Innov.1	0.838												

Factors/ items	St. Loading	CR	AVE	MSV	Ma R(H)	COOD	INDEP	RESG	DIV	ASP SOC	ASP ECO	ASP ENV	INNOV
Innov.10	0.728												
Innov.2	0.783												
Innov.3	0.871												
Innov.4	0.799												
Innov.8	0.837												
Innov.9	0.809												

Note: CR = Composite Reliability; AVE = Average Variance Extracted; MSV = Maximum Shared Value; ASV = Average Shared Value.

Source: Own elaboration.

3.3. Results of the structural equation modelling analysis

To investigate the effect of collective intelligence on green innovation (GI) through corporate social responsibility (CSR), structural equation modelling (SEM) was conducted using AMOS 23 software after confirming the reliability and validity of measurement instruments. Table 4 reports a Chi-square value with a χ^2/df ratio of 4.457, which falls below the recommended threshold of 5 (Roussel et al., 2002), indicating a satisfactory model fit, in line with Hair et al. (2014). Furthermore, the RMSEA and RMR values are 0.077 and 0.081, respectively, remaining below 0.1 and close to zero, thereby confirming an acceptable approximation.

Table 4. Hypotheses results.

Causality links	Links (CR)	Significance of relationships	Hypotheses Validation
H1: Collective intelligence → Green innovation	0.733 (14.177)	***	Confirmed
H2: Collective intelligence → CSR	0.458 (9.017)	***	Confirmed
H3: CSR → Green innovation	0.126(3.621)	***	Confirmed

Note: Model fit: χ^2 (757, N = 745) = 3373.949 $p < 0.001$, normed $\chi^2 = 4.457$, RMSEA = 0.077; SRMR = 0.081, CFI = 0.962, TLI = 0.950, NFI = 0.936, IFI = 0.962, *** $p < 0.001$.

Source: Own elaboration.

The model fit is additionally supported by the incremental fit indices IFI = 0.962, NFI = 0.936, TLI = 0.950, and CFI = 0.962, all of which indicate a very good fit. All hypotheses were validated, with all relationships significant at $p < 0.001$ (Figure 3).

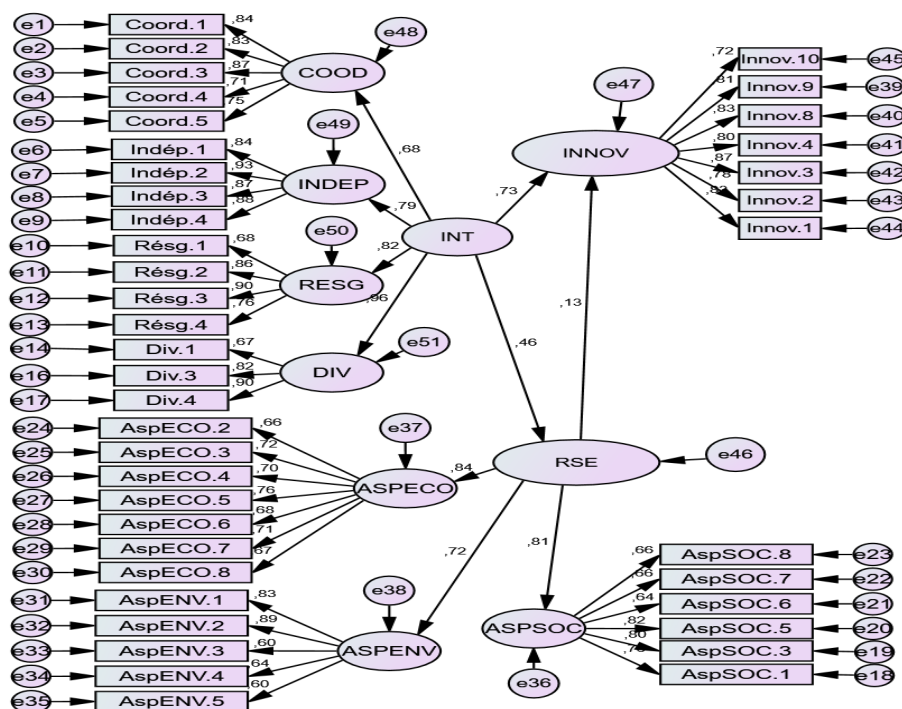


Figure 3. The Structural Model.

Source: Own elaboration.

Specifically, GI is significantly and positively influenced by collective intelligence ($\beta = 0.733$, $p < 0.001$) and by CSR ($\beta = 0.126$, $p < 0.001$). Moreover, CSR is significantly and positively affected by collective intelligence ($\beta = 0.458$, $p < 0.001$). The R-square values demonstrate that a substantial proportion of the variance in GI is explained by collective intelligence and CSR, supporting the robustness and stability of the final structural model.

We applied Baron and Kenny (1986) method to examine the mediating role of CSR in the relationship between collective intelligence and GI (Table 5).

Table 5. Mediation results.

	Links (C.R.)	Significance of relationships
Step 1: Collective intelligence $\rightarrow$ Green innovation (c)	0.790 (15.198)	***
Step 2: Collective intelligence $\rightarrow$ CSR (a)	0.457(8.937)	***
Step 3: CSR $\rightarrow$ Green innovation (Considering the effect of the Collective Intelligence dimension on CSR) (b)	0.164(15.183)	***
Step 4: Indirect Effect of Collective Intelligence on Green Innovation: 0.075		
Full Mediation – Positive Indirect Effect avec $Z = 4.458$ et $p = 0.000$		

Source: Own elaboration.

This procedure involves four consecutive steps. First, to establish that there is an effect to be mediated, the direct link between collective intelligence and GI must be significant, which was confirmed ($\beta = 0.733$, $p < 0.001$). The coefficient is significant in the regression of GI on collective intelligence. Second, the effect of collective intelligence on the mediator, CSR, was tested and found to be significant. Third, the relationship between CSR and the dependent variable, GI, was examined while controlling collective intelligence; the effect of CSR on GI remained significant. This involves conducting a regression including both CSR and collective intelligence. Finally, to determine whether the mediation is partial or full, the direct effect of collective intelligence on GI was assessed in the presence of CSR. The link remained significant ($\beta = 0.762$, $p < 0.001$), confirming a partial mediation. Additionally, the respective t-values for the paths, t_a and t_b , are 8.973 and 15.183, and the Sobel test yielded $Z = 4.458$ with $p < 0.001$. Overall, the results presented in Table 4 indicate that CSR partially mediates the relationship between collective intelligence and green innovation.

4. Discussion

Based on these results, the SEM analysis revealed significant positive relationships among all model variables. Collective intelligence had a significant positive effect on green innovation (H1: $\beta = 0.733$, $p < 0.001$) and CSR (H2: $\beta = 0.458$, $p < 0.001$). These findings align with prior studies demonstrating that collective intelligence stimulates green innovation (Wang et al., 2021; Bekk et al., 2016; Boder, 2006; Engel et al., 2014; Mukhtar et al., 2025).

Collective decision-making, knowledge sharing, and employee collaboration support the accumulation of ecological knowledge and the generation of creative ideas. This, in turn, leads to environmentally responsible solutions. Executives confirmed that shared concern for environmental values encourages creativity, organisational dynamism, and the implementation of green innovation practices. Collective intelligence also positively influenced CSR by fostering idea exchange, coordinating efforts, and developing innovative solutions. This provides a conducive framework for integrating the economic, social, and environmental dimensions of CSR. These results are consistent with prior research showing that collective mobilisation and CSR practices mutually reinforce one another in promoting socially and environmentally responsible innovations (Boder, 2006; Kolk, 2016; Vilanova et al., 2009; Carroll, 1991; Maignan, 2001; Asrar-ul-Haq et al., 2017; Yun et al., 2019; Mukhtar et al., 2025).

Executives also noted that Tunisia's commitment to sustainable development and national initiatives promoting green entrepreneurship strongly influence corporate strategies. Collaboration, information sharing, and dissemination of sustainability knowledge encourage responsible practices across economic, social, and environmental dimensions. Collective intelligence and CSR thus form a complementary framework for developing and implementing green innovation. The third

hypothesis, linking CSR to green innovation, was also supported. CSR provides an environment conducive to strategies integrating environmental and social concerns. This enables firms to respond effectively to challenges. These strategies foster creativity, responsible resource management, and the development of environmentally friendly solutions (Wang et al., 2021; Karimi Takalo et al., 2021; Gürler, 2024; Hong et al., 2020).

Executives reported that CSR engagement transformed production processes, making them more efficient and environmentally sensitive while fostering the development of innovative, less polluting products.

Analysis of CSR's mediating role between collective intelligence and green innovation indicated partial mediation. Following Baron and Kenny (1986), the direct effect of collective intelligence on green innovation remained significant after introducing CSR ($\beta = 0.762$, $p = 0.000$). This suggests that CSR strengthens the relationship but does not fully explain the environmental innovation process. Firms rely on collaborative practices, knowledge circulation, collective competencies, and formal social and environmental engagement through CSR. These findings align with recent studies highlighting CSR's role in sustainable innovation. Chen and Jin (2023) show that CSR engagement fosters cleaner technologies through stakeholder involvement. Guinot et al., (2023) report that social responsibility toward employees supports organizational learning, a key mechanism for green innovation. Novitasari and Tarigan (2022) note that green innovation acts as a channel through which CSR improves organisational performance. Alauddin (2023) identifies green creativity as a central mechanism linking CSR practices to environmental innovation. The same author confirms the robustness of the positive relationship between CSR and green innovation across sectors and contexts.

Executives' feedback further supports these findings. CSR adoption led firms to revise production methods, favouring leaner and more environmentally responsible processes. Promoting sustainability values internally encourages collaboration, generates new ideas, and facilitates the development of less polluting products. CSR thus acts as a facilitator of green innovation, even if its effect is partial in the relationship between collective intelligence and environmental innovation capabilities.

Conclusions

This study aimed to examine the effect of collective intelligence on green innovation and to highlight the mediating role of CSR. The results of our study of 745 Tunisian industrial firms indicate that collective intelligence has a significant, positive effect on green innovation. In particular, knowledge sharing, skills mobilisation, leveraging experience, and coordination of efforts foster organisational creativity and opportunity identification, thereby driving the development of innovative and environmentally friendly products. These dynamics enable firms to address sustainability challenges and better meet current ecological and social demands. Furthermore, applying the Baron and Kenny (1986) method confirmed the partial mediating role of CSR in the relationship between collective intelligence and green innovation. In other words, collective intelligence alone is not sufficient to drive green innovation; its effectiveness depends on the implementation of CSR practices. CSR provides a supportive organisational framework that channels collective intelligence toward responsible and sustainable practices, thereby encouraging the development of environmentally friendly innovations.

Finally, although we successfully integrated three variables previously studied separately in the literature into a single theoretical model, the study has limitations, particularly regarding the exclusion of moderating variables considered crucial for robustness. Notably, these include CSR culture and management commitment. Indeed, CSR culture, embodied in the organisation's shared values and norms, plays a crucial role in transforming collective intelligence into concrete green innovation initiatives. Specifically, it aligns collective objectives with sustainability goals, reinforces organisational identity, and consequently stimulates green innovation initiatives (Melo & Garrido-Morgado, 2012).

Managerial commitment, in turn, drives the mobilisation of resources and the pursuit of proactive initiatives. The greater the managerial commitment, the more collaborative practices are encouraged and likely to result in innovative, environmentally friendly solutions (Rasheed et al., 2024; Liu et al., 2023). Given these limitations, it would be useful to consider moderating variables. A comparative study across other sectors could also shed light on how collective intelligence and social responsibility work together to drive green innovation.

From a theoretical perspective, we successfully integrated three variables previously examined separately in the literature into a single model: green innovation, corporate social responsibility (CSR), and collective intelligence. Our findings demonstrate that collective intelligence is a key driver of green innovation. Coordinating efforts, mobilising expertise, sharing knowledge, and enhancing the skills and collective identity of organisational members foster the recognition of opportunities and the development of innovative solutions. These dynamics allow firms to respond more effectively to environmental challenges, particularly those related to sustainability and ecological protection. Furthermore, our contribution highlights the pivotal role of CSR within this relationship. CSR serves as a strategic framework that guides and structures collaborative practices stemming from collective intelligence, thereby channelling organizational efforts toward the design of innovative projects that fully integrate social and environmental concerns.

From a practical and managerial perspective, we aim to provide managers with evidence encouraging greater investment in collective intelligence, notably through mechanisms that promote collective decision-making, knowledge sharing, and skills development. Our results also show that the benefits of collective intelligence are amplified when combined with CSR. Ultimately, managers should embed CSR into the firm's overall strategy and actively involve employees in order to achieve decisions that are not only innovative but also genuinely sustainable

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How Marketing Insight Shapes Brand Engagement and Loyalty: An Integrated Model of Psychological, Behavioural, and Creative Antecedents

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Abstract

This study proposes and tests an integrated model of marketing insight—a brand's ability to understand and respond to how consumers think, feel, act, and derive meaning—comprising three theoretically grounded dimensions: psychological insight (attachment, self-congruity, brand trust), behavioural insight (habit, participatory behaviours), and creative insight (perceived creativity, narrative authenticity, symbolic resonance). Each dimension is theoretically mapped onto one of the three constitutive components of Consumer Brand Engagement (CBE) theory, ensuring coherence between the antecedent system and the mediating construct. A cross-sectional consumer survey (N = 462) was analysed using PLS-SEM. All three insight dimensions significantly predict brand engagement, which in turn predicts loyalty, with the model explaining 79.2% of variance in engagement and 72.7% in loyalty. Critically, the pathway from insight to loyalty is contingent: creative insight affects loyalty exclusively through engagement (full mediation; VAF = 54.9%), while psychological and behavioural insights retain significant direct routes to loyalty (partial mediation), with behavioural insight exhibiting the strongest direct path ($\beta = 0.480$). This contingency finding advances CBE theory by demonstrating that engagement is not a universal relational intermediary—a nuance that prior fragmented, single-antecedent models were structurally unable to detect. The study reconceptualises marketing insight as a measurable antecedent system, empirically differentiates habitual loyalty from engaged loyalty, and provides managers with a diagnostic framework for balancing psychological, behavioural, and creative brand strategies across industry contexts including technology brands, fast-moving consumer goods, and fashion and lifestyle categories.

Key words

marketing insight, brand engagement, brand loyalty, attachment theory, semiotics; structural equation modelling.

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Introduction

Understanding how meaningful and enduring consumer–brand relationships emerge has become a central concern in marketing research, driven by the recognition that consumers form connections shaped not only by transactional exchanges but by emotional resonance, habitual routines, and symbolic or narrative relevance. Recent research confirms that digital platforms intensify these dynamics by serving as strategic tools for strengthening customer relationships beyond product purchases (Schewe et al., 2025), while also complicating them through influencer marketing and algorithmic content that reshape consumer autonomy and brand–consumer interaction (Aade & Goanta, 2025; Capellà i Ricart, 2025). Emerging technologies including generative AI and algorithmic personalisation tools are further transforming how brands build engagement and loyalty by enabling increasingly tailored and immersive consumer experiences (Lazaroiu & Rogalska, 2024), adding urgency to the need for integrated frameworks that can account for these evolving dynamics. These multifaceted mechanisms (emotional, behavioural, and symbolic) point to a construct that has

received surprisingly little integrated theoretical attention: marketing insight, defined here as a brand's ability to understand and respond to how consumers think, feel, act, and derive meaning in ways that strengthen both engagement and loyalty. Unlike satisfaction or attitude, marketing insight is a brand-side capability that operates across psychological, behavioural, and creative registers simultaneously, making it a more comprehensive lens through which to examine the antecedents of consumer–brand relationships.

Recent developments in consumer behaviour research emphasise consumer brand engagement (CBE) as a richer and more powerful predictor of loyalty than traditional constructs such as satisfaction (Hollebeek et al., 2014; Khan et al., 2019). Engagement captures consumers' cognitive, emotional, and behavioural investment in brand interactions, reflecting the extent to which a brand stimulates attention, participation, and affective attachment (Schivinski et al., 2016). Contemporary scholarship on brand communities demonstrates that engagement is driven by consumers' self-congruence with brand-associated figures, reinforcing the importance of identity alignment in consumer–brand relationships (Khandeparkar et al., 2025). As consumers increasingly participate in co-creating brand meaning, namely through social media, digital content, and interactions with other users, engagement becomes not merely a reaction to persuasive messages but an expression of an ongoing relationship.

Although substantial research has examined antecedents of engagement, most empirical work has done so through a fragmented lens. Studies have explored emotional attachment, identity congruence, or brand trust on the one hand (Chaudhuri & Holbrook, 2001; Sirgy, 1982; Thomson et al., 2005), behavioural patterns such as habitual purchasing and online participatory behaviour on another (Muntinga et al., 2011; van Doorn et al., 2010; Verplanken & Wood, 2006), and creative or symbolic aspects of brand communication, including storytelling, semiotics, and advertising creativity, on yet another (Ang et al., 2007; Escalas, 2004; Holt, 2002; Oswald, 2012). Recent research continues to examine storytelling in isolation, demonstrating its role in mediating the relationship between brand identity and brand performance (Fluhrer, 2025), while research on digital consumer behaviour further demonstrates that habit, trust, and perceived risk operate as behavioural and cognitive drivers of engagement even in highly technological contexts such as mobile commerce adoption (Andronie et al., 2021), reinforcing the need to account for these mechanisms within any integrated model of consumer–brand relationships. While these individual streams offer strong theoretical foundations, they have rarely been integrated into a single, empirically tested framework. This fragmentation represents a significant gap in the literature: we lack a holistic understanding of how psychological, behavioural, and creative mechanisms jointly, and distinctly, shape brand engagement and loyalty.

The choice of psychological, behavioural, and creative as the three constitutive dimensions of marketing insight is theoretically motivated rather than arbitrary. Consumer Brand Engagement (CBE) theory, the central theoretical lens of this study, conceptualises engagement as a tripartite motivational state comprising cognitive–affective investment, behavioural activation, and meaning-based involvement (Brodie et al., 2011; Hollebeek et al., 2014). These three engagement dimensions map directly onto three corresponding antecedent domains: psychological mechanisms (attachment, identity congruence, trust) that activate the cognitive–affective core of engagement; behavioural mechanisms (habit, participatory routines) that correspond to its activation dimension; and creative mechanisms (symbolic meaning, narrative authenticity, advertising creativity) that shape the meaning-based involvement through which brands become culturally relevant. Social factors, while important, operate primarily as moderators or contextual amplifiers of these core processes rather than as independent antecedent dimensions; for instance, social identity effects are largely captured within the self-congruity component of psychological insight (Sirgy, 1982), and social visibility effects are embedded within the participatory behaviour component of behavioural insight (Muntinga et al., 2011). The three-pillar structure thus mirrors the tripartite constitution of engagement itself, ensuring

theoretical coherence between the antecedent system and the mediating construct it is designed to explain.

At the same time, research in psychology and neuroscience has shown that consumer responses are influenced not only by cognitive information processing (Petty & Cacioppo, 2012) but also by emotional, associative, and automatic mechanisms (Knutson et al., 2007). The rise of interactive and user-generated media has intensified these dynamics by enabling consumers to reinterpret, modify, and publicly communicate brand meaning. These developments point to the need for a more comprehensive theoretical lens that captures the psychological, behavioural, and creative sources of insight that brands use, implicitly or explicitly, to build deeper consumer relationships.

The present study addresses this gap by proposing and testing an integrated model in which psychological insight, behavioural insight, and creative insight act as distinct yet interrelated antecedents of brand engagement and loyalty. Psychological insight draws on attachment theory, self-congruity theory, and brand trust literature to explain how emotional and cognitive bonds motivate investment in the brand relationship. Behavioural insight reflects habit theory and consumer engagement behaviour frameworks to capture the role of repetition, routine, and participatory action in reinforcing relational patterns. Creative insight draws on semiotics, narrative identity theory, and advertising creativity research to account for how meaning, authenticity, and symbolic resonance drive attention and involvement.

By integrating these three previously siloed streams within a unified empirical model, this study advances Consumer Brand Engagement theory in a specific and demonstrable way: it shows that engagement's mediating role between antecedents and loyalty is contingent rather than universal. Prior CBE research has largely treated engagement as a generic mediating mechanism applicable across antecedent types (Brodie et al., 2011; Tyrväinen et al., 2023); this study challenges that assumption by demonstrating empirically that creative insight influences loyalty exclusively through engagement (full mediation), while psychological and behavioural insights retain direct routes to loyalty that bypass engagement – routes grounded respectively in attachment and trust theory (Morgan & Hunt, 1994) and habit-based automaticity (Verplanken & Wood, 2006). This contingency finding is the study's primary theoretical contribution: it specifies when engagement is the central engine of loyalty and when alternative mechanisms prevail, adding needed precision to a literature that has tended to treat engagement as a universal relational intermediary. A second original contribution is the reconceptualization of marketing insight itself as a multidimensional, measurable antecedent system – moving it from strategic abstraction to an operational construct with distinct psychological, behavioural, and creative components, each grounded in established theory and empirically testable. Together, these contributions offer a more nuanced and complete account of how brands build loyalty than any single-stream model has previously provided.

The remainder of this article is structured as follows. The next section reviews the theoretical foundations of psychological, behavioural, and creative insight, situating them within the broader evolution from persuasion-based to engagement-based models of consumer–brand relationships. The subsequent section describes the research design, measurement approach, and analytical procedures. Following this, the empirical results are presented, including assessments of the measurement and structural models. The final two sections present the discussion of findings and the conclusions, the latter encompassing theoretical implications, managerial contributions, and limitations and future research perspectives.

1. Literature review

1.1. *From attitudes and persuasion to engagement: theoretical grounding*

Marketing scholarship has historically relied on persuasion and attitude-change models to explain consumer responses to brand communications. Classic "hierarchy of effects" frameworks, such as AIDA, proposed that consumers progress through sequential cognitive and affective stages before acting (Lavidge & Steiner, 1961; Rogers et al., 2014), depicting consumers as rational processors who

evaluate message content and form attitudes that guide behaviour. Dual-process theories later refined this view by acknowledging that persuasion operates through both deliberative and heuristic routes. The Elaboration Likelihood Model (Petty & Cacioppo, 2012) and Heuristic-Systematic Model (Chaiken, 1980) distinguish between systematic scrutiny of arguments and reliance on simple cues such as source attractiveness, while research on mere exposure further showed that repeated contact can enhance liking even without conscious processing, highlighting automatic, pre-attentive mechanisms that operate below deliberate awareness (Janiszewski, 1993; Zajonc, 1968).

While foundational, these models are limited in explaining contemporary consumer-brand relationships. First, they cast consumers as passive message recipients, overlooking their active role in shaping brand meaning (Vargo & Lusch, 2014). Second, they privilege short-term persuasion episodes rather than ongoing relational processes (Fournier, 1998). Third, they focus primarily on cognitive evaluation, giving marginal attention to the emotional, symbolic, and behavioural dimensions that characterise modern brand interactions, especially in digital environments where engagement involves not only processing information but participating, expressing, and co-creating (Hollebeek et al., 2014).

Consumer Brand Engagement (CBE) theory emerged in response to these limitations. Drawing on service-dominant logic (Vargo & Lusch, 2014) and relationship marketing (Morgan & Hunt, 1994), CBE conceptualises engagement as a multidimensional motivational state in which consumers invest cognitive effort, emotional energy, and behavioural activation during brand interactions (Brodie et al., 2011; Hollebeek et al., 2014). Rather than treating consumers as targets of persuasion, engagement theory positions them as active contributors who co-create value through interactions with brands. This relational orientation aligns with digital contexts, where consumers routinely produce, share, and respond to brand-related content, transforming communication from monologue into dialogue (Muntinga et al., 2011).

From this perspective, engagement captures not only what consumers think about brands but also what they feel and do in relation to them – the higher-order investments that signify durable relationships. Building on this shift, the present study moves beyond traditional persuasion models to examine how brands' understanding of consumers, captured through psychological, behavioural, and creative dimensions of marketing insight, cultivates the engaged state from which loyalty emerges.

1.2. Psychological insight: attachment theory, self-congruity, and brand trust

The psychological dimension of marketing insight is grounded in complementary theoretical traditions explaining how consumers develop deep emotional and cognitive connections with brands. Attachment theory, originally formulated to describe emotional bonds between infants and caregivers (Bowlby, 1969), has been extended to consumer research to account for the strong affective ties people form with brands (Thomson et al., 2005). Brand attachment involves feelings of affection, passion, and closeness, reflecting the degree to which a brand becomes integrated into one's self-concept (Park et al., 2010). This connection is qualitatively distinct from mere liking: attached consumers experience psychological proximity and discomfort when the relationship is threatened. They exhibit greater loyalty, advocacy, forgiveness after failures, and resistance to negative information (Park et al., 2010; Thomson et al., 2005). Emotional branding efforts that evoke personal memories and self-relevant meanings intensify these bonds (Thompson et al., 2006), a dynamic accentuated in digital contexts where personalized content strengthens emotional responses (He et al., 2022).

Self-congruity theory (Sirgy, 1982) adds a cognitive layer by proposing that consumers gravitate toward brands reflecting aspects of their self-concept. Perceived alignment between brand image and one's actual, ideal, or social self-fosters preference because it affirms identity and provides a vehicle for self-expression (Sirgy et al., 1997). When brands symbolically mirror who consumers are or aspire to be, they become meaningful identity extensions, encouraging investment of cognitive and emotional resources in maintaining the relationship (Bagozzi & Dholakia, 2006). Recent research in the brand management literature confirms that self-congruity operates across multiple dimensions

(actual, ideal, and social) each exerting distinct effects on brand-related outcomes (Ivanauskaitė et al., 2026). Meta-analytic evidence confirms that self-congruity predicts loyalty through its effects on emotional attachment and engagement (Tyrväinen et al., 2023).

A third pillar is brand trust, which captures consumers' confidence in a brand's reliability, integrity, and benevolence (Chaudhuri & Holbrook, 2001; Morgan & Hunt, 1994). Trust is especially valuable in digital environments where uncertainty and information asymmetry may be heightened, functioning as a heuristic that reduces perceived risk and facilitates deeper engagement (Hollebeek et al., 2014). It develops through consistent performance, transparent communication, and fulfilment of promises (Delgado-Ballester & Luis Munuera-Alemán, 2001). In relationship marketing, trust is a central driver of commitment (Morgan & Hunt, 1994), enabling consumers to invest emotionally and behaviourally without concern about opportunism. This mechanism aligns with recent findings that personally relevant information and transparent communication directly influence consumer decision quality and relational outcomes (Devlin & Mukerji, 2025). Trust also enhances willingness to share information, co-create value, and recommend the brand (Hollebeek et al., 2014).

Taken together, attachment, self-congruity, and trust form the psychological foundation of marketing insight. Consumers who feel emotionally bonded to a brand, perceive it as aligned with their identity, and trust its reliability are predisposed to engage more intensely and sustainably. This multidimensional psychological grounding distinguishes marketing insight from superficial constructs such as satisfaction precisely because it captures the depth mechanisms (emotional bonding, identity alignment, and relational confidence), through which consumers become motivated to invest in brand relationships. Rather than treating these three traditions as parallel but separate explanations, the psychological dimension of marketing insight synthesizes them into a single antecedent construct: brands that simultaneously evoke attachment, reflect consumer identity, and demonstrate trustworthiness activate all three pathways to engagement concurrently, producing a stronger and more resilient relational foundation than any single mechanism could generate alone. Therefore:

H1: Psychological insight (emotional resonance, trust, identity congruence) is positively associated with brand engagement.

1.3. Behavioural insight: habit theory and consumer engagement behaviour

The behavioural dimension of marketing insight draws primarily on habit theory and the literature on consumer engagement behaviours, both emphasizing the role of repeated and observable actions in shaping brand relationships. Habit theory explains how behaviours performed frequently in stable contexts gradually become automatic responses triggered by situational cues rather than deliberate decision-making (Verplanken & Wood, 2006). Through repeated enactment, control shifts from conscious intentions to procedural memory, rendering behaviour more efficient and less susceptible to cognitive evaluation (Neal et al., 2006). In consumer contexts, such habits manifest in routine purchasing, regular product use, or automatic brand selection, streamlining choice processes and creating familiarity and ease (Wood & Neal, 2009). Importantly, habitual brand use can sustain loyalty even without strong affective ties, highlighting the role of "cold" automatic processes in maintaining consumer-brand bonds.

Digital environments amplify habit formation. Platform design features – personalized recommendations, algorithmically curated content, notifications, reward mechanisms – create stable contextual cues that encourage repeated interaction (Sharma et al., 2024). Over time, these cues reinforce behavioural routines that become self-sustaining. This behavioural regularity contributes to brand loyalty not only through repeated actions but also through the inertia it generates, making alternative choices less likely even without explicit intention to remain loyal.

Complementing habit theory, the consumer engagement behaviour (CEB) literature conceptualizes how consumers behave toward brands beyond purchasing. Van Doorn et al. (2010) include word-of-mouth, reviewing, helping other customers, and co-creation activities, reflecting varying degrees of behavioural investment. In online contexts, these actions are further elaborated

within the COBRA (Consumers' Online Brand-Related Activities) model, distinguishing between consumption (viewing brand content), contribution (liking, commenting, sharing), and creation (producing user-generated content) (Muntinga et al., 2011; Schivinski et al., 2016). These behaviours not only signal involvement but also create public visibility and social validation, embedding the brand within a broader social context (Khan & Fatma, 2019).

Behavioural manifestations serve as both outcomes of psychological processes and reinforcing mechanisms. When consumers repeatedly interact with a brand, by purchasing, discussing, or engaging with online content, they create patterns of familiarity and social presence that deepen the relationship. These routines also contribute to self-expression and identity signalling, as interactive behaviours occur within networks where others observe and interpret them (Muntinga et al., 2011). Empirical evidence confirms that such behavioural engagement predicts loyalty outcomes, particularly in digital and social media contexts where interactive behaviours serve as relational signals and reinforcers (Ajina, 2019; Tyrväinen et al., 2023).

Together, these perspectives conceptualize behavioural insight as the collection of habitual and interactive behaviours through which consumers enact their brand relationship. These behaviours reflect learned, routinized patterns that can operate independently of conscious attitudes while reinforcing relational bonds through participation, visibility, and repetition. Crucially, habit theory and consumer engagement behaviour are not competing explanations but complementary mechanisms that together constitute the behavioural dimension of marketing insight: habit captures the automatic, cue-driven dimension of brand-relevant action, while consumer engagement behaviour captures the more deliberate, socially visible dimension. Brands that understand both (designing for frictionless routine while also stimulating participatory involvement), activate behavioural insight across both automatic and motivated registers, embedding themselves more durably in consumers' everyday lives than brands that rely on either mechanism alone. Therefore:

H2: Behavioural insight (habitual and interactive behaviours toward the brand) is positively associated with brand engagement.

1.4. Creative insight: semiotics, narrative identity, and advertising creativity

The creative dimension of marketing insight is anchored in semiotics, narrative theory, and advertising creativity research, illuminating how brands communicate meaning and cultivate engagement. Semiotic theory conceptualizes brands as systems of signs that communicate cultural, social, and identity-relevant meanings beyond functional attributes (Barthes, 1977; Holt, 2002; Oswald, 2012). Brands acquire symbolic value by representing lifestyles, ideologies, or cultural tensions that consumers interpret and integrate into personal meaning frameworks. Through advertising, design, and storytelling, brands construct symbolic associations that consumers use to navigate identity, signal belonging, or differentiate themselves (Holt, 2002; McCracken, 1986). When these cues resonate, the brand becomes a meaningful cultural resource, drawing consumers into deeper cognitive and emotional involvement.

Closely related is narrative identity theory, which argues that individuals construct self through internalized life stories integrating past experiences, present roles, and future aspirations (McAdams, 2001). Brands become part of these narratives when they offer stories that mirror or enrich consumers lived experiences. Escalas (2004) shows that narrative processing promotes self-brand connections by encouraging consumers to imagine themselves within the story. Narrative transportation theory further explains how immersive brand stories reduce critical resistance and heighten emotional engagement, ultimately promoting favourable attitudes and relational bonds (van Laer et al., 2013). Stories perceived as authentic-coherent, value-based, emotionally truthful—are especially powerful, fostering trust and deepening connection (He et al., 2022). This is particularly salient given recent regulatory attention to influencer marketing and brand communication authenticity. As Aade and Goanta (2025) demonstrate, the governance of brand-related content increasingly shapes how consumers perceive and respond to commercial messages.

These mechanisms intersect with advertising creativity, commonly defined along two dimensions: originality (novelty, divergence from expectations) and appropriateness (relevance, meaningfulness to audience) (Ang et al., 2007; Smith et al., 2008). Creative communications capture attention, stimulate elaboration, and evoke emotional responses, enhancing brand recall, attitude strength, and engagement. In digital environments where content abundance heightens competition for attention, creativity becomes a crucial differentiator. Visually distinctive, aesthetically compelling, and narratively coherent brand communications signal authenticity, human presence, and cultural awareness (He et al., 2022; Oswald, 2012).

Brand authenticity bridges these theoretical strands. Defined as the perception that a brand is genuine, principled, and true to its values, authenticity strengthens the relationship between creative expression and engagement (Beverland, 2005; Napoli et al., 2014). Creative content aligned with brand heritage and conveying transparency fosters the sense that communication is motivated by more than commercial self-interest, increasing trust, deepening identity alignment, and heightening willingness to invest in the relationship (He et al., 2022; Napoli et al., 2014).

Taken together, these perspectives position creative insight as the brand's ability to translate understanding of consumers' cultural, symbolic, and emotional worlds into communications that are meaningful, distinctive, and authentic. When creative expression resonates, consumers become more cognitively absorbed, emotionally connected, and behaviourally activated. While semiotics, narrative identity theory, and advertising creativity may appear as disparate fields, they converge into a coherent creative dimension of marketing insight through a shared mechanism: each explains how brands generate meaning that transcends functional product attributes and becomes personally or culturally relevant to consumers. Semiotic systems provide the symbolic vocabulary through which brands acquire cultural significance; narrative identity theory explains how consumers incorporate that significance into their self-concept through story; and advertising creativity determines whether the resulting communication is sufficiently distinctive and appropriate to capture attention and stimulate elaboration. Together, these three streams describe a sequential meaning-making process, from cultural symbolism, through personal narrative, to creative execution, that constitutes the creative insight a brand deploys to cultivate deeper consumer involvement. Therefore:

H3: Creative insight (perceived creativity, authenticity, symbolic resonance) is positively associated with brand engagement.

1.5. Brand engagement and loyalty: engagement theory as mediating mechanism

The relationship between engagement and loyalty is rooted in Consumer Brand Engagement (CBE) theory, which conceptualizes engagement as a multidimensional motivational state comprising cognitive, emotional, and behavioural investment in brand interactions (Brodie et al., 2011; Hollebeek et al., 2014). Stemming from service-dominant logic and relationship marketing (Morgan & Hunt, 1994; Vargo & Lusch, 2014), this perspective emphasises that value is co-created through ongoing, reciprocal interactions rather than produced solely by firms and delivered to passive consumers. Engagement reflects the intensity and quality of these interactions: cognitively, sustained attention and mental elaboration; emotionally, enthusiasm, inspiration, and positive affect; behaviourally, energy, effort, and activation directed toward the brand (Hollebeek et al., 2014). This tripartite structure distinguishes engagement from narrower constructs such as satisfaction or involvement, positioning it as a dynamic, relational process capturing how consumers think, feel, and act in ways that signify deep connection. It should be noted that the dimensionality of CBE has been subject to debate: some scholars argue for a unidimensional conceptualization at higher levels of abstraction (Dwivedi, 2015), while others propose that cognitive and emotional dimensions are difficult to disentangle empirically and may cluster together in practice (Khan et al., 2019). Nevertheless, the tripartite structure remains the most widely adopted and theoretically grounded framework in the CBE literature (Brodie et al., 2011; Hollebeek et al., 2014), and is retained here because it maps directly onto the three insight dimensions proposed in this study – psychological insight activating the cognitive-affective core, behavioural insight corresponding to the activation dimension, and creative

insight operating through meaning-based involvement – thereby preserving theoretical coherence across the full model.

Commitment-trust theory further reinforces this link. Morgan and Hunt (1994) argue that commitment and trust serve as foundational mediators linking relational antecedents to outcomes such as cooperation and relationship continuation. Engagement can be viewed as an activated form of commitment, where consumers not only intend to maintain the relationship but invest psychological and behavioural resources in doing so. Trust strengthens the relationship by reducing vulnerability and enabling engagement without fear of opportunism (Chaudhuri & Holbrook, 2001). Together, these perspectives suggest engagement is a key mechanism through which relational antecedents translate into loyalty.

Empirical evidence consistently supports this proposition. Engaged consumers exhibit greater repurchase intentions, stronger resistance to competitors, higher willingness to pay premium prices, and elevated advocacy behaviours (Dwivedi, 2015; Khan et al., 2019). The mediating role of engagement is further supported by recent findings that brand attachment amplifies the relationship between satisfaction and engagement, which in turn drives loyalty (Lim et al., 2025). Meta-analytic findings demonstrate that engagement mediates the effects of diverse antecedents, from brand experience to social media content, on loyalty (Tyrväinen et al., 2023), reinforcing its role as a proximal driver of enduring behavioural outcomes.

In this study, engagement is conceptualized as the mechanism linking psychological, behavioural, and creative insights to brand loyalty. However, the strength and nature of this mediating role may vary by antecedent. Psychological insight, rooted in attachment, identity congruence, and trust, may influence loyalty both indirectly through engagement and directly through affective commitment and confidence. Behavioural insight, reflecting habit and participatory routines, may also exert direct effects through automaticity and behavioural inertia (Neal et al., 2006; Verplanken & Wood, 2006). Creative insight, by contrast, is theorized to influence loyalty primarily through engagement, as its effects rely on capturing attention, fostering meaning, and generating emotional resonance rather than directly shaping repeat behaviour.

Thus, engagement is expected to play a mediating role between each insight dimension and loyalty, but the extent of mediation may differ across mechanisms. Therefore:

H4: Brand engagement positively predicts brand loyalty.

H5: Brand engagement mediates the relationship between (a) psychological insight, (b) behavioural insight, (c) creative insight – and brand loyalty.

1.6. Integrative framework, boundary conditions, and theoretical positioning

The preceding review establishes psychological, behavioural, and creative insight as theoretically distinct yet complementary antecedents of consumer brand engagement. Psychological insight, rooted in attachment, self-congruity, and trust, explains how identification and confidence motivate internal commitment. Behavioural insight, grounded in habit theory and consumer engagement behaviour, describes how routinised action and participatory practices embed the brand in everyday life. Creative insight, anchored in semiotics, narrative identity, and advertising creativity, shows how symbolically resonant, authentic communications command attention and meaning. Together, these dimensions converge on engagement as the proximal mechanism translating consumer understanding into durable relational outcomes, while recognising that certain mechanisms may also generate direct effects on loyalty.

Within this framework, each insight dimension maps onto engagement's cognitive, emotional, and behavioural constitution while retaining theoretical specificity. Psychological insight aligns with engagement's cognitive-affective core by fostering self-relevance, attachment, and trust. Behavioural insight corresponds to its activation component by shaping repeated choice and visible participation. Creative insight operates primarily through cognitive-affective routes by structuring symbolic meaning, aesthetic distinctiveness, and narrative immersion that draw consumers into deeper involvement. The model therefore positions psychological, behavioural, and creative insights as

distinct antecedents of engagement, which in turn predicts brand loyalty, while allowing for mediated and direct routes to loyalty in accordance with theory. Figure 1 illustrates the proposed conceptual model.

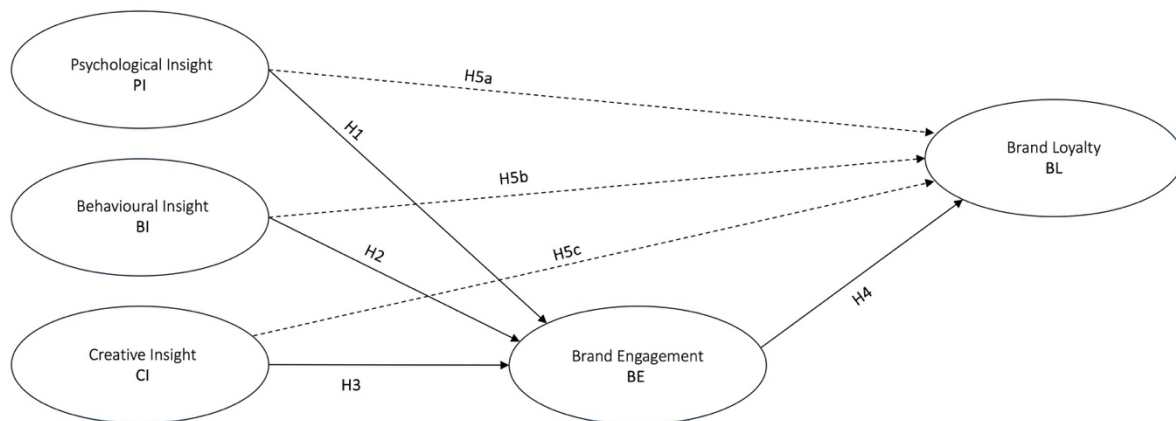


Figure 1. Conceptual model linking psychological, behavioural, and creative insight to brand engagement and loyalty.

Source: Own source.

This positioning also clarifies the model's scope and boundary conditions. Related constructs (brand love, brand experience, psychological ownership) intersect with aspects of the proposed antecedents and engagement itself. Some scholars suggest these relational constructs cluster around two cores, attachment and active engagement, which conceptually overlap with the roles assigned here to psychological and behavioural/creative insights. To preserve parsimony and avoid redundancy, the present model treats marketing insight as the antecedent system and engagement as the mediating process channelling these antecedents into loyalty, while empirically allowing direct paths when warranted by trust- or habit-based mechanisms. Contextual contingencies are acknowledged: effects may vary by category involvement, cultural setting, or platform ecology, inviting future research through moderating designs or multi-group analysis. By consolidating dispersed theoretical streams into a single testable architecture, the framework specifies how emotional resonance, routine enactment, and symbolic authenticity jointly produce engagement and, through it, loyalty, without foreclosing direct pathways where theory and evidence justify them.

2. Methodology

2.1. Sample and data collection

This study adopts a quantitative, cross-sectional survey design, which is well-established in consumer-brand relationship research as an appropriate approach for testing structural models of psychological, behavioural, and attitudinal constructs (Hair et al., 2019; Hollebeek et al., 2014). Cross-sectional surveys allow simultaneous measurement of multiple latent constructs across a large sample, enabling the estimation of complex structural relationships between antecedents and outcomes within a single analytical framework (Podsakoff et al., 2012). This design is widely employed in the international brand engagement and loyalty literature to test theoretically derived models using self-reported consumer perceptions (Dwivedi, 2015; Tyrväinen et al., 2023), and is particularly suited to PLS-SEM, which is optimized for variance-based prediction in complex, theory-building models (Ringle et al., 2025). Data were collected via an online self-administered questionnaire from December 2025 to January 2026. Eligibility required respondents to be at least 18 years old and to have purchased or browsed a brand of their choice in the previous 12 months. Participation was voluntary and anonymous, with informed consent obtained on the first survey page.

The questionnaire was distributed through social networks and university channels, constituting a convenience sampling approach. Two independent experts reviewed the instrument for content

validity, and a pilot test with 15 students assessed comprehensibility and completion time, leading to minor wording refinements. While this convenience sample provides sufficient statistical power for the proposed structural model, it is not probabilistic and therefore limits generalisability to broader consumer populations; this constraint is acknowledged among the study's limitations (see Section 5). Of the 497 responses received, 462 were retained after applying pre-specified exclusion rules: responses with more than 10% missing values were removed for incompleteness; those exhibiting straight-lining (identical responses across five or more consecutive items) were excluded for patterned responding; and those completed in less than one-third of the median completion time were removed as implausibly fast. These criteria were defined prior to data collection to avoid post-hoc subjectivity in case exclusion.

Table 1 presents the sample characteristics. Participants ranged in age from 18 to 73 years ($M = 29.3$, $SD = 13.06$), and 60.8% were female ($n = 281$). Respondents reported moderate to high familiarity with their chosen brand ($M = 4.11$, $SD = 0.96$), frequency of product interaction ($M = 3.79$, $SD = 0.97$), and product category involvement ($M = 3.86$, $SD = 0.95$). Most participants (35.7%) spent four to five hours online daily. Skewness and kurtosis values for all continuous variables were within acceptable ranges ($|Sk| < 2$, $|Kr| < 7$), indicating approximately normal distributions (Curran et al., 1996).

Table 1. Sample characteristics.

Variable	M	SD	SE	Sk	Kr
Age	29.3 (18–73)	13.06	0.61	1.33	0.62
Familiarity with the brand (1-5)	4.11	0.96	0.05	-1.18	1.34
Interaction frequency with the brand's products (1-5)	3.79	0.97	0.05	-0.66	0.16
Involvement with the brand's product category (1-5)	3.86	0.95	0.04	-0.66	0.24
	N	%			
Gender					
Female	281	60.8			
Male	181	39.2			
Online average time spent per day					
< 1 hour	57	12.3			
1-2 hours	119	25.8			
3-4 hours	165	35.7			
5-6 hours	65	14.1			
> 6 hours	56	12.1			

Notes: M = Mean; SD = Standard deviation; SE = Standard error; Sk = Skewness; Kr = Kurtosis; N= frequency; % = Percentage.

Source: developed by authors.

2.2. Measurements

The survey comprised two sections. Section A captured demographics and brand-related habits (familiarity, interaction frequency, product category involvement, and average daily online time). Section B included 27 reflective items measuring five constructs on five-point Likert scales (1 = strongly disagree, 5 = strongly agree). All scales were adapted from established sources. Psychological insight (five items) was adapted from Thomson et al. (2005), Chaudhuri and Holbrook (2001), and Hollebeek et al. (2014), capturing emotional attachment, self-congruity, and brand trust. Behavioural insight (four items) drew on Verplanken and Wood (2006), Muntinga et al. (2011), and Schivinski et al. (2016), reflecting habitual purchasing and online participatory behaviours. Creative insight (six items) was adapted from Ang et al. (2007), Holt (2002), and He et al. (2022), measuring perceived creativity, narrative authenticity, and symbolic resonance.

Brand engagement (five items) was based on Hollebeek et al. (2014) and Dwivedi (2015), capturing consumers' cognitive, emotional, and behavioural investment in brand interactions. Brand loyalty (five items) drew on Chaudhuri and Holbrook (2001) and Dwivedi (2015), reflecting repurchase intentions, preference, and advocacy.

To mitigate common method variance, procedural remedies followed Podsakoff et al. (2012): respondent anonymity, counterbalanced question order, clear item wording, and attention checks

with reverse-coded items. Statistical assessments of common method variance are reported in the Results section.

2.3. Data analysis

Data analysis proceeded in three stages. Preliminary descriptive statistics were computed using SPSS (Version 30); all subsequent measurement model and structural model analyses were performed exclusively using partial least squares structural equation modelling (PLS-SEM) with SmartPLS 4 (Ringle et al., 2025), which is a variance-based approach well-suited for complex predictive models and mediation analysis, performing well with non-normal data (Hair et al., 2019).

First, preliminary descriptive statistics were computed to characterize the sample and examine distributional properties (Table 1). Item-level means, standard deviations, skewness, kurtosis, and standardised factor loadings were calculated for all 27 reflective items.

Second, the measurement model was evaluated prior to hypothesis testing. Internal consistency was assessed using Cronbach's alpha (α) and composite reliability (CR), with values exceeding 0.70 considered acceptable (Fornell & Larcker, 1981; Nunnally, 1978). Convergent validity was established by examining average variance extracted (AVE) for each construct, requiring a threshold of 0.50 or higher (Fornell & Larcker, 1981). Discriminant validity was assessed using two criteria: the Fornell-Larcker criterion, which requires that the square root of AVE for each construct exceed its highest correlation with any other construct (Fornell & Larcker, 1981); and the Heterotrait-Monotrait ratio of correlations (HTMT), for which values below 0.90 indicate acceptable discriminant validity and values below 0.85 indicate strict discriminant validity (Henseler et al., 2015).

Third, the structural model was estimated to test hypotheses H1–H5. Path coefficient significance was determined through bootstrapping with 5,000 subsamples, generating standard errors and confidence intervals (Hair et al., 2019). Explanatory power was evaluated using the coefficient of determination (R^2) for endogenous constructs, and predictive relevance through effect sizes (f^2) following Cohen (2013) guidelines. To test the hypothesized mediating role of brand engagement (H5a–H5c), specific indirect effects were examined using bootstrapped confidence intervals (Hayes, 2017).

3. Research results

3.1. Measurement items and model validity

Item loadings were all significant, ranging from 0.647 to 0.847. The loading for BI1 ($\lambda = 0.647$) falls marginally below the conventional 0.70 threshold; however, following Hair et al. (2019), removal is only warranted if it would raise the construct's AVE above 0.50, a condition already satisfied (AVE = 0.602), and given that BI1 captures a conceptually distinct facet of behavioural insight (online content engagement), it was retained on grounds of content validity. All VIF values are below 3.0, confirming the absence of multicollinearity among indicators. Descriptive statistics for all measurement items are presented in Table 2.

Table 2. Measurement items: descriptive statistics.

Code	Description	M	SD	Sk	Kr	λ	VIF
PI	Psychological Insight	3.31	1.228				
PI1	This brand reflects who I am.	2.99	1.080	−0.149	−0.452	0.786	1.901
PI2	I feel emotionally connected to this brand.	2.96	1.220	−0.012	−0.842	0.804	1.934
PI3	This brand says something about me as a person.	2.92	1.270	−0.006	−0.977	0.844	2.390
PI4	I trust this brand completely.	3.71	1.100	−0.674	−0.090	0.768	1.777
PI5	This brand gives me a sense of comfort and familiarity.	3.99	1.030	−0.962	0.491	0.710	1.595
BI	Behavioural Insight	3.39	1.207				
BI1	I frequently engage with this brand's online content.	3.00	1.200	−0.102	−0.859	0.647	1.261
BI3	I talk about this brand with others.	3.77	1.080	−0.690	−0.107	0.793	1.581
BI4	I often purchase or use products from this brand.	3.84	1.110	−0.823	0.025	0.807	1.765
BI5	I tend to choose this brand automatically when shopping.	3.54	1.200	−0.467	−0.684	0.842	1.910
CI	Creative Insight	3.30	1.186				
CI1	This brand's communication is creative and original.	3.59	1.060	−0.363	−0.511	0.753	1.819

Code	Description	M	SD	Sk	Kr	λ	VIF
CI2	The brand tells a compelling and authentic story.	2.90	1.250	0.069	-0.908	0.733	1.664
CI3	This brand's advertisements are visually appealing and distinctive.	3.54	1.140	-0.397	-0.577	0.814	2.147
CI5	This brand stands out for its innovative presentation style.	3.23	1.170	-0.184	-0.629	0.825	2.234
CI6	This brand's advertising stands out from those of its competitors.	3.24	1.170	-0.233	-0.661	0.847	2.756
CI7	The brand's advertisements are effective in capturing my attention.	3.30	1.190	-0.221	-0.765	0.844	2.646
BE	Brand Engagement	3.23	1.220				
BE1	I am enthusiastic about this brand.	3.66	0.995	-0.456	-0.193	0.752	1.653
BE2	I feel energized when interacting with this brand.	3.02	1.190	-0.111	-0.715	0.835	2.148
BE3	This brand captures my attention.	3.48	1.180	-0.492	-0.584	0.818	1.939
BE4	I put effort into engaging with this brand.	2.64	1.280	0.226	-0.971	0.755	1.710
BE5	I enjoy discussing or sharing experiences about this brand.	3.34	1.170	-0.246	-0.721	0.730	1.562
BL	Brand Loyalty	3.78	1.161				
BL1	I intend to continue purchasing this brand in the future.	4.25	0.925	-1.310	1.460	0.772	1.892
BL2	I would recommend this brand to others.	4.24	0.906	-1.390	2.060	0.791	1.978
BL3	I prefer this brand over other similar brands.	3.86	1.000	-0.745	0.115	0.781	1.732
BL4	I consider myself loyal to this brand.	3.33	1.230	-0.299	-0.808	0.794	2.014
BL5	Even if other brands are on sale, I would still buy this one.	3.20	1.250	-0.204	-0.910	0.774	1.873

Notes: *M* = Mean; *SD* = Standard deviation; *Sk* = Skewness; *Kr* = Kurtosis; λ = Standardized loadings. Items BI2 and CI4 were removed following the pilot test due to low comprehensibility scores and were not included in the final instrument. Source: developed by authors.

Prior to testing the structural model, reliability and validity of the measurement scales were assessed. All constructs were measured using reflective indicators adapted from established scales. As shown in Table 3, all constructs demonstrated good internal consistency, with Cronbach's alpha (α) values exceeding 0.70 (Nunnally, 1978). Composite reliability (CR) scores were all above 0.78, further confirming reliability.

Convergent validity was established as average variance extracted (AVE) for each construct exceeded 0.50 (Fornell & Larcker, 1981). Discriminant validity was assessed using the Fornell-Larcker criterion (Fornell & Larcker, 1981). The square root of AVE for each construct (shown on the diagonal in Table 3) was greater than its correlations with all other constructs, satisfying the Fornell-Larcker criterion.

Table 3. Correlations, reliability and convergent validity of constructs.

Construct	M	SD	Correlations					Cronbach's α	CR	AVE
			PI	BI	CI	BE	BL			
PI	3.31	0.895	0.784	0.864	0.846	0.887	0.882	0.842	0.844	0.614
BI	3.54	0.889	0.694***	0.776	0.722	0.890	0.879	0.774	0.783	0.602
CI	3.30	0.934	0.730***	0.601***	0.804	0.829	0.742	0.889	0.891	0.646
BE	3.23	0.905	0.828***	0.716***	0.804***	0.779	0.882	0.836	0.839	0.607
BL	3.78	0.834	0.740***	0.795***	0.650***	0.747***	0.782	0.836	0.842	0.612

Notes: Bold diagonal values are the square roots of AVEs. All correlations (below diagonal in bold) are significant at $p < 0.001$; HTMT values (italic) above diagonal in bold. *M* = mean; *SD* = Standard deviation; *CR* = Composite reliability; *AVE* = Average variance extracted.

Source: developed by authors.

3.2. Structural model and hypotheses testing

The proposed structural model (Fig. 1) was analysed using PLS-SEM with SmartPLS 4. Path coefficient significance was determined through bootstrapping with 5,000 subsamples. The model's explanatory power was substantial, with R^2 values of 0.792 for Brand Engagement and 0.727 for Brand Loyalty, indicating the predictor variables explained 79.2% and 72.7% of variance in these endogenous constructs, respectively.

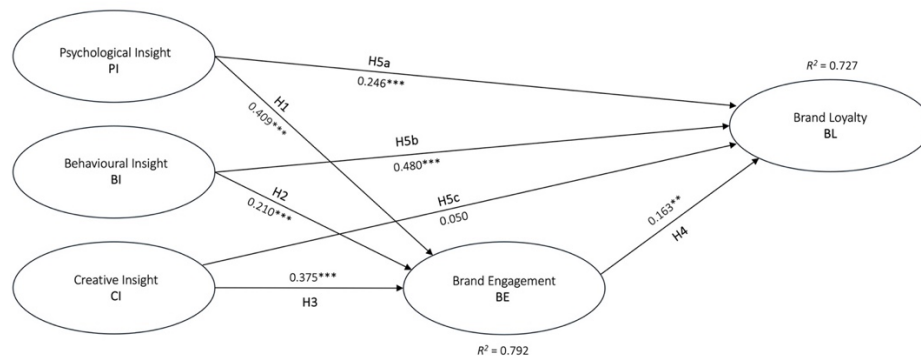


Figure 2. Structural model with standardized path coefficients.

Source: Own source.

Results of the path analysis are presented in Tables 4 and 5 and Fig. 2. All direct paths from the three insight dimensions to Brand Engagement were positive and statistically significant, supporting H1, H2, and H3. Psychological Insight (PI) had the strongest effect on Brand Engagement (BE) ($\beta = 0.409$, $p < 0.001$), followed by Creative Insight (CI) ($\beta = 0.375$, $p < 0.001$), and Behavioural Insight (BI) ($\beta = 0.210$, $p < 0.001$).

Supporting H4, Brand Engagement had a significant positive effect on Brand Loyalty (BL) ($\beta = 0.163$, $p = 0.005$). Analysis of direct effects from insight dimensions to Brand Loyalty revealed significant paths for Psychological Insight ($\beta = 0.246$, $p < 0.001$) and Behavioural Insight ($\beta = 0.480$, $p < 0.001$), but not for Creative Insight ($\beta = 0.050$, $p = 0.278$).

To test proposed mediation hypotheses (H5a–c), specific indirect effects were examined. Results confirmed that Brand Engagement significantly mediated relationships between all three insight dimensions and Brand Loyalty. Indirect effects of Psychological Insight ($\beta = 0.067$, $p = 0.007$), Behavioural Insight ($\beta = 0.034$, $p = 0.013$), and Creative Insight ($\beta = 0.061$, $p = 0.007$) on Brand Loyalty via Brand Engagement were all significant. These findings support H5a, H5b, and H5c, indicating partial mediation for PI and BI (given remaining significant direct effects), and full mediation for CI (as its direct effect was non-significant).

Table 4. Path coefficients and hypothesis testing results.

Hypothesis	Path	Path Coefficient (β)	Standard Deviation	CI2.5%	CI97.5%	p	Supported?
H1	PI → BE	0.409	0.041	0.330	0.489	< .001	Yes
H2	BI → BE	0.210	0.032	0.147	0.271	< .001	Yes
H3	CI → BE	0.375	0.040	0.296	0.454	< .001	Yes
H4	BE → BL	0.163	0.058	0.051	0.276	0.005	Yes
-	PI → BL (Direct)	0.246	0.053	0.145	0.352	< .001	-
-	BI → BL (Direct)	0.480	0.042	0.397	0.560	< .001	-
-	CI → BL (Direct)	0.050	0.046	0.046	1.085	0.278	-

Notes: SD = Standard deviation; CI2.5% and CI97.5% = Confidence interval bounds. p = p-value; β = Standardized coefficients.

Source: Own source.

Table 5. Specific indirect (mediation) effects.

Hypothesis	Mediation Path	Indirect Effect (β)	SD	CI2.5%	CI97.5%	p	Supported?
H5a	PI → BE → BL	0.067	0.025	0.021	0.115	.007	Yes
H5b	BI → BE → BL	0.034	0.014	0.010	0.064	.013	Yes
H5c	CI → BE → BL	0.061	0.023	0.018	0.107	.007	Yes

Notes: SD = Standard deviation; CI2.5% and CI97.5% = Confidence interval bounds. p = p-value; β = Standardized coefficients.

Source: Own source.

3.3. Model Fit and Predictive Relevance

Model fit was evaluated using criteria recommended for PLS-SEM (Henseler et al., 2015; Ringle et al., 2025). The standardised root mean square residual (SRMR = 0.042) fell well below both the recommended threshold of 0.08 and the 95% bootstrap confidence interval boundary (HI95 = 0.045), indicating close model-data correspondence. The discrepancy measures d_ULS (observed = 0.526, HI95 = 0.665) and d_G (observed = 0.245, HI95 = 0.275) were likewise below their respective confidence interval boundaries, confirming that the model cannot be rejected at the 5% significance level (Henseler et al., 2015). Taken together, these indices provide strong support for the adequacy of the proposed structural model.

The model demonstrated strong predictive relevance, as indicated by the high R^2 values. The effect sizes (f^2) for the paths were evaluated. According to Cohen (2013) guidelines, the effects of PI ($f^2 = 0.280$) and CI ($f^2 = 0.302$) on BE, and BI ($f^2 = 0.374$) on BL, were medium to large. The effect of BE on BL was small ($f^2 = 0.020$).

3.4. Analysis of the Mediation Effects

To further delineate brand engagement's mediating role, direct and indirect effects were analysed to classify each mediated relationship. Following established guidelines (Baron & Kenny, 1986; Hayes, 2017), full mediation occurs when the indirect effect is significant while the direct effect is non-significant; partial mediation occurs when both indirect and direct effects remain significant.

The analysis revealed distinct mediation patterns for each insight dimension. For Psychological Insight $\rightarrow$ Brand Loyalty, the indirect effect via Brand Engagement was significant ($\beta = 0.067$, $p = 0.007$), while the direct effect remained strong ($\beta = 0.246$, $p < 0.001$), indicating partial mediation. For Behavioural Insight $\rightarrow$ Brand Loyalty, a significant indirect effect ($\beta = 0.034$, $p = 0.013$) accompanied a strong direct effect ($\beta = 0.480$, $p < 0.001$), also supporting partial mediation. The direct effect from behavioural insight to loyalty was the strongest path in the model, indicating that habitual and participatory behaviours influence loyalty largely independently of engagement. For Creative Insight $\rightarrow$ Brand Loyalty, the indirect effect was significant ($\beta = 0.061$, $p = 0.007$), but the direct effect was non-significant ($\beta = 0.050$, $p = 0.278$), meeting criteria for full mediation. Creative insight's influence on loyalty is therefore entirely channelled through its capacity to generate brand engagement.

To quantify the mediated pathway's relative importance, Variance Accounted For (VAF) was calculated. VAF was approximately 21.4% for Psychological Insight, 6.6% for Behavioural Insight, and 54.9% for Creative Insight, further substantiating partial mediation for psychological and behavioural insight and full mediation for creative insight, while highlighting the dominant direct effect of behavioural routines on loyalty.

The direct path from Behavioural Insight to Brand Loyalty ($\beta = 0.480$) was the strongest single path in the structural model, substantially exceeding both its indirect effect via engagement ($\beta = 0.034$) and the direct paths from Psychological and Creative Insight to loyalty. The VAF of 6.6% further underscores that engagement accounts for only a marginal portion of Behavioural Insight's total effect on loyalty ($\beta = 0.514$), with the overwhelming share trans-mitted through a direct route.

4. Discussion

This study developed and tested a multidimensional model of marketing insight, examining its role as an antecedent to brand engagement and loyalty. Drawing on attachment theory, self-congruity, and brand trust; habit theory and consumer engagement behaviour; and semiotics, narrative identity, and advertising creativity, the model proposed that psychological, behavioural, and creative insight collectively enhance consumers' cognitive, emotional, and behavioural investment in brands – a state conceptualized as brand engagement.

The structural model demonstrated substantial explanatory power, accounting for 79.2% of variance in brand engagement and 72.7% in brand loyalty. This robust performance confirms that a holistic understanding of consumers, encompassing inner psychological states, observable behavioural patterns, and perceptions of brand creativity, is critical for fostering meaningful brand

relationships in the digital age (Hollebeek et al., 2014). The findings support the shift in marketing theory from persuasion-based models, which conceptualize consumers as passive message recipients (Petty & Cacioppo, 2012), to insight-driven relational frameworks positioning consumers as active co-creators of value (Vargo & Lusch, 2014).

All three hypotheses proposing direct effects of insight dimensions on brand engagement were strongly supported (H1–H3), though path strength varied in theoretically meaningful ways. Psychological insight ($\beta = 0.409$) emerged as the strongest predictor of engagement, underscoring the foundational role of emotional resonance and cognitive trust in driving consumer investment. This aligns with attachment theory (Bowlby, 1969; Thomson et al., 2005): consumers who feel emotionally connected, perceive brand self-relevance (Sirgy, 1982), and trust brand reliability (Chaudhuri & Holbrook, 2001) are naturally predisposed to invest cognitive and emotional resources. The potency of this path reinforces that engagement is a psychological state rooted in identification and trust, consistent with commitment-trust theory (Morgan & Hunt, 1994). Recent work confirms this interpretation, showing customer-brand identification as the strongest pathway linking interactivity to loyalty (Derinozlu & Pir, 2026). This finding extends Tyrväinen et al.'s (2023) meta-analytic evidence that self-congruity and attachment predict loyalty through engagement by specifying the relative weight of the psychological pathway in a model that simultaneously includes behavioural and creative antecedents, which is something prior single-stream studies could not establish. Furthermore, the strength of this path ($\beta = 0.409$) exceeds that reported in studies examining psychological antecedents of engagement in isolation (e.g., Lim et al., 2025), suggesting that measuring psychological insight as a multidimensional composite, integrating attachment, self-congruity, and trust simultaneously, captures more variance in engagement than single-construct operationalizations.

Creative insight ($\beta = 0.375$) also exhibited a powerful effect on engagement, slightly below psychological insight. This supports semiotic and narrative perspectives (Holt, 2002; Oswald, 2012): brands communicate meaning through symbolic systems that consumers interpret and integrate into identities. Creative advertisements that are original, appropriate (Ang et al., 2007), and narratively compelling (Escalas, 2004) capture attention and stimulate emotional engagement. In saturated digital environments, creative content signals authenticity and human connection (He et al., 2022; Napoli et al., 2014), serving as a differentiator that draws consumers into deeper involvement.

The finding that creative insight influences loyalty exclusively through engagement, with a non-significant direct path ($\beta = 0.050$, $p = 0.278$) and a VAF of 54.9%, warrants explicit theoretical explanation, as it is the starkest mediation pattern in the model and the one that most clearly distinguishes creative mechanisms from psychological and behavioural ones. The reason creative insight cannot generate loyalty directly lies in the nature of the mechanisms it activates. Semiotics, narrative identity, and advertising creativity all operate through meaning-making and attention-capture processes that are, by definition, proximal to engagement rather than to behaviour: they draw consumers into cognitive absorption, emotional resonance, and symbolic identification, states that constitute engagement, but do not themselves trigger the repeated behavioural choices, habitual routines, or relational commitments that translate directly into loyalty. Unlike psychological insight, which activates attachment and trust (motivational states that can sustain commitment even during periods of low engagement) or behavioural insight, which activates habit (an automatic mechanism that sustains repeat choice independently of motivational investment), creative insight has no analogous direct pathway to loyalty. Its influence is entirely contingent on successfully converting meaning and attention into the invested relational state that engagement represents. This finding aligns with and extends prior work on advertising creativity, which consistently shows that creative communications enhance brand attitudes and engagement but require attitudinal and relational intermediaries to translate into behavioural loyalty outcomes (Ang et al., 2007; Smith et al., 2008). It also resonates with narrative transportation research demonstrating that story immersion heightens emotional engagement but that the behavioural consequences of transportation are mediated by

attitude change and relational investment rather than direct (van Laer et al., 2013). The full mediation finding therefore provides empirical precision to what prior research has implied theoretically: creative execution is a powerful engine of engagement but an inefficient direct driver of loyalty, and brands that invest in creative distinctiveness without measuring its conversion into engagement are likely to misread their returns.

Behavioural insight ($\beta = 0.210$) had a significant yet weaker direct effect on engagement. This nuances habit theory (Verplanken & Wood, 2006; Wood & Neal, 2009) and the COBRA framework (Muntinga et al., 2011). While habitual interactions – repeat purchases, social media likes, content consumption – are part of engaged relationships, they may often be manifestations or consequences of deeper psychological and creative connections rather than primary initiators. Observable behaviours are a necessary but not sufficient component of multidimensional engagement, which is more heavily laden with cognitive and affective elements (Hollebeek et al., 2014). Digital platforms may amplify behavioural traces (Khan et al., 2019). The finding that Behavioural Insight exerts its dominant effect on loyalty through a direct path ($\beta = 0.480$) rather than through engagement ($\beta = 0.034$, VAF = 6.6%) merits particular attention, as it appears to tension with the theoretical centrality of engagement as a mediating mechanism. However, this pattern is theoretically coherent when viewed through the lens of habit theory (Verplanken & Wood, 2006; Wood & Neal, 2009). Habitual behaviours – routine purchasing, automatic brand selection, repeated platform interaction – are by definition executed with minimal cognitive-affective deliberation. Once habits are formed, behavioural output becomes decoupled from motivational states: consumers repeat brand-relevant actions not because they are actively engaged but because contextual cues trigger procedural responses stored in memory (Neal et al., 2006). Loyalty sustained by habit is therefore qualitatively distinct from loyalty generated through engagement; it is more accurately characterized as behavioural inertia than relational investment. This interpretation aligns with dual-process accounts of consumer behaviour (Petty & Cacioppo, 2012), which distinguish between automatic, cue-driven responses and deliberative, motivation-laden processing. The engagement construct, by contrast, captures precisely the deliberative, invested dimension of the consumer-brand relationship (Hollebeek et al., 2014), explaining why it mediates creative and psychological insight – both of which operate through meaning-making and identity processes – but adds relatively little explanatory power beyond the direct behavioural pathway. Far from being a weakness of the model, this asymmetry is a substantive finding: it demonstrates empirically that brands can sustain loyal behaviour through two qualitatively different mechanisms, and that conflating behavioural frequency with motivational engagement risks misdiagnosing the sources of loyalty resilience. This finding converges with and extends prior empirical work: Ajina (2019) demonstrated that behavioural engagement predicts loyalty in digital contexts but did not distinguish habitual from motivated behavioural pathways; Tyrväinen et al. (2023) showed meta-analytically that engagement mediates the effect of social media behaviours on loyalty, but again without isolating the direct habit-based route. The present study advances both, by demonstrating that the direct behavioural pathway to loyalty is not only significant but dominant, suggesting that prior studies relying solely on mediated models may have systematically underestimated the loyalty returns of habit-reinforcing brand strategies.

The significant positive effect of brand engagement on brand loyalty ($\beta = 0.163$, H4 supported) reaffirms a core tenet of Consumer Brand Engagement theory (Brodie et al., 2011; Hollebeek et al., 2014). It validates that the invested, active relationship characterized by engagement is a proximal driver of loyal intentions and advocacy (Dwivedi, 2015; Khan et al., 2019). This result is consistent with Tyrväinen et al.'s (2023) meta-analytic finding that engagement mediates the relationship between diverse antecedents and loyalty across multiple contexts and aligns with Khan et al.'s (2019) demonstration that engagement drives loyalty in online service settings. Notably, however, the relatively modest path coefficient ($\beta = 0.163$) compared to the direct effects of psychological ($\beta = 0.246$) and behavioural ($\beta = 0.480$) insight on loyalty suggests that engagement's role as a loyalty driver is meaningful but not dominant when competing with direct antecedent pathways, which is a nuance

that single-antecedent studies, which estimate engagement's effect on loyalty without controlling for direct insight pathways, are structurally unable to detect. This underscores the value of the integrated model: it reveals that prior studies may have overestimated engagement's direct contribution to loyalty by omitting the direct routes through which psychological and behavioural antecedents independently sustain it.

The present findings were obtained in a digital consumer context, and it is worth considering how the observed pathways might differ outside this setting. In non-digital contexts, habit formation operates through different cues – physical store layouts, shelf placement, and face-to-face service interactions – rather than algorithmic personalization and platform design features, potentially weakening the dominant direct behavioural pathway to loyalty relative to what we observe here. Psychological mechanisms, by contrast, may be equally or more powerful in offline settings where tangible product experiences and interpersonal brand interactions intensify attachment and trust more directly than digitally mediated content. Creative insight's full mediation through engagement may also attenuate in non-digital contexts where exposure to brand communications is less frequent, immersive, and interactive, and where narrative transportation is more difficult to sustain consistently. These reflections suggest that the relative dominance of the three insight pathways is not fixed but contingent on channel ecology, and that future research should investigate these boundary conditions through multi-context or cross-channel designs comparing digital and non-digital brand relationship dynamics.

Taken together, the findings advance the literature in four interrelated ways that can be situated against prior empirical evidence. First, this study demonstrates that engagement's mediating role between antecedents and loyalty is contingent rather than universal, a finding that directly challenges the implicit assumption in prior CBE research that engagement functions as a generic intermediary across antecedent types (Brodie et al., 2011; Tyrväinen et al., 2023). By specifying that creative insight operates exclusively through engagement while psychological and behavioural insights retain direct routes grounded respectively in attachment and trust theory (Morgan & Hunt, 1994) and habit-based automaticity (Verplanken & Wood, 2006), the paper adds precision to a literature that has tended to treat engagement as a universal relational engine. This contingency pattern has not been previously identified in the CBE literature, where mediation analyses have typically been conducted within single-antecedent frameworks that structurally preclude detecting differential mediation across competing pathways.

Second, the study reconceptualizes marketing insight as a multidimensional, measurable antecedent system, moving it from strategic abstraction to an operational construct with distinct psychological, behavioural, and creative components, each grounded in established theory and jointly tested within a single empirical model. Psychological insight draws on attachment theory, self-congruity, and brand trust to activate engagement's cognitive-affective core (Bowlby, 1969; Chaudhuri & Holbrook, 2001; Park et al., 2010; Sirgy, 1982). Behavioural insight incorporates habit formation and consumer engagement behaviour to correspond with engagement's activation dimension (Muntinga et al., 2011; van Doorn et al., 2010; Verplanken & Wood, 2006; Wood & Neal, 2009). Creative insight harnesses semiotics, narrative identity, and advertising creativity to shape symbolic meaning that fuels engagement (Ang et al., 2007; Escalas, 2004; He et al., 2022; Holt, 2002; McAdams, 2001; Nenni et al., 2014; Oswald, 2012; Smith et al., 2008; van Laer et al., 2013). Articulating these links turns marketing insight from a strategic abstraction into an operational framework for future research, providing a theoretically coherent antecedent architecture that prior fragmented studies, each examining one stream in isolation, could not supply.

Third, the study bridges previously fragmented theoretical streams – attachment and self-congruity, habit and consumer engagement behaviour, semiotics and narrative creativity – within a single process model. Rather than positioning these literatures as competing explanations, the integrated model specifies complementary mechanisms and identifies where some bypass engagement to exert direct effects on loyalty, clarifying long-standing debates about the relative roles

of cognition, routine, and symbolism in relationship strength (Morgan & Hunt, 1994; Napoli et al., 2014; Wood & Neal, 2009). The finding that psychological and behavioural insights exert direct effects on loyalty is consistent with Quaye et al. (2022), who demonstrated that brand relationship quality and trust serially mediate the customer advocacy-loyalty relationship, highlighting that loyalty formation involves multiple partially independent pathways, and extends that finding by identifying habit-based automaticity as a second direct route that operates independently of both trust and engagement. The differential mediation patterns observed across insight dimensions also resonate with Wiese et al. (2026), who found that brand respect and self-brand connection operate through distinct pathways to influence consumer responses to negative information, further reinforcing that multiple qualitatively different mechanisms jointly sustain brand loyalty and that collapsing them into a single pathway misrepresents how loyalty is actually built and maintained.

Fourth, this study empirically differentiates habitual loyalty from engaged loyalty in a way that prior research has theorized but rarely demonstrated within a single model. The dominant direct effect of behavioural insight on loyalty ($\beta = 0.480$) – substantially exceeding both its indirect effect through engagement ($\beta = 0.034$, VAF = 6.6%) and all other direct paths in the model – demonstrates that repeat choice can be sustained by automaticity even with modest cognitive-emotional involvement. This finding advances Tyrväinen et al.'s (2023) meta-analytic evidence by showing that when habit-based and engagement-based pathways compete within the same structural model, the habit-based route dominates, suggesting that prior studies estimating engagement's effect on loyalty without controlling for direct behavioural pathways have systematically overestimated engagement's relative contribution. It also nuances Ajina's (2019) finding that content marketing engagement predicts loyalty by demonstrating that the behavioural traces of brand interaction sustain loyalty largely through direct habit mechanisms rather than through the motivational investment that engagement theory emphasizes, cautioning against treating observable behavioural frequency as evidence of genuine relational engagement.

The findings offer a diagnostic lens for managers to audit and balance the three insight dimensions sustaining loyalty. Brands should assess whether current performance leans too heavily on any single pathway: psychological resonance (attachment, identity alignment, trust), behavioural reinforcement (habit, frictionless choice, visible participation), or creative authenticity (symbolic meaning, narrative immersion). Over-reliance on one-dimension risks fragile loyalty: purely habit-driven repeat purchase can erode quickly when switching frictions decline, while creativity that does not convert to engagement rarely sustains behaviour. A practical audit would triangulate attitudinal indicators, behavioural traces, and perceptual signals of creativity to identify portfolio imbalances.

Creative strategy should be judged primarily by its ability to generate engagement, not merely awareness or aesthetic preference. Given that creative insight influences loyalty only through engagement, managers should operationalize creative KPIs capturing narrative immersion and participatory response (e.g., depth of content interactions, quality of user contributions), linking them to downstream behaviours via experimentation. Campaigns that are distinctive and culturally resonant but fail to activate comments, shares, or co-creation are unlikely to generate durable outcomes; investment should shift toward formats and story architectures that measurably raise engagement propensity. This is particularly relevant for fashion and lifestyle brands, where symbolic resonance and narrative authenticity are primary engagement drivers: a visually striking campaign that generates impressions but not interaction signals creative expenditure without relational return, whereas content formats that invite co-creation – user-generated styling challenges, brand narrative participation, community story-telling – measurably convert creative impact into the engagement that sustains loyalty.

Psychological strategy should consolidate trust and identity alignment as dual insurance: these mechanisms both elevate engagement and provide a direct safety net to loyalty. Managers can reinforce this layer through transparent promises, reliable service recovery, and identity-consistent touchpoints (e.g., personalization reflecting self-concept rather than mere recommendation

accuracy). Brand governance should monitor "trust moments" (privacy, price fairness, product quality) and "identity moments" (tone of voice, community ethos, symbolic fit); when strong, loyalty becomes less vulnerable to dips in short-term engagement. For technology brands, where rapid product cycles, data privacy concerns, and competitive switching are pervasive, this dual monitoring is especially critical: trust eroded by a single privacy incident or pricing inconsistency can dissolve identity alignment that took years to build, making proactive governance of trust and identity touchpoints a higher-order strategic priority than campaign-level creative investment.

Behavioural strategy should intentionally design for habit without confusing frequency with engagement. Because behaviour can sustain loyalty directly via routine and friction reduction, managers should optimize choice architecture (default options, one-tap repurchase, replenishment reminders), loyalty mechanics (status tiers, soft benefits), and omnichannel consistency to stabilize repeat behaviour. These habit loops should be overlaid with psychological and creative elements (trust cues, identity-relevant messaging, periodic narrative refresh), to defend against commoditization and convert "cold" routine into "warm" engagement where possible. In fast-moving consumer goods (FMCG) categories, where habitual repurchase is the dominant loyalty mechanism and emotional differentiation is difficult to sustain, this overlay strategy is the primary defence against private-label substitution: subscription defaults, loyalty card frictionlessness, and replenishment automation stabilize the behavioural base, while periodic identity-consistent messaging and purpose-driven brand narratives inject psychological and creative texture that elevates routine choice above pure price-driven inertia.

Resource allocation should follow the model's contingent pathways. Where symbolic differentiation is decisive, creative investment raising engagement will be highest-leverage. In low-involvement contexts, habit and user experience investments yield more immediate loyalty dividends, provided baseline trust and identity fit are maintained. Portfolio management should periodically rebalance, reinforcing whichever dimension is the bottleneck and validate changes through tests linking insight shifts → engagement shifts → loyalty outcomes.

Conclusions

This study validates an integrated framework in which psychological, behavioural, and creative insights function as distinct yet complementary antecedents of brand engagement, which in turn contributes to brand loyalty. All three insight dimensions significantly and positively predict engagement, and the model explains substantial variance in both engagement (79.2%) and loyalty (72.7%), confirming the centrality of a multidimensional insight perspective in contemporary consumer-brand relationships.

The study's primary theoretical contribution is demonstrating that engagement's mediating role between antecedents and loyalty is contingent rather than universal. Creative insight affects loyalty indirectly through engagement (full mediation), consistent with symbolic meaning and narrative immersion mobilizing involvement as a necessary precondition for behavioural loyalty outcomes. By contrast, psychological and behavioural insights display both indirect and direct routes to loyalty (partial mediation): psychological mechanisms operate through attachment and trust, generating relational commitment that sustains loyalty independently of engagement levels, while behavioural mechanisms operate through habit and routine, yielding the strongest direct association with loyalty among all paths in the model. These results distinguish engaged loyalty, energized by cognitive-affective involvement, from habitual loyalty, stabilized by automatic choice, showing that brands can secure loyalty through qualitatively different insight configurations and that the appropriate strategic lever depends on which pathway is dominant in a given category or context.

A second contribution is the reconceptualization of marketing insight as a multidimensional, measurable antecedent system. By operationalizing psychological, behavioural, and creative insight as distinct yet theoretically coherent constructs, each mapped onto one of the three constitutive dimensions of Consumer Brand Engagement theory, the study transforms marketing insight from a

strategic abstraction into an empirically testable framework. This provides a theoretically grounded architecture for future research to build on, extend, and refine across different contexts, categories, and cultural settings.

A third contribution is the integration of previously fragmented theoretical streams – attachment and self-congruity, habit and consumer engagement behaviour, semiotics and narrative creativity – within a single process model. Rather than positioning these literatures as competing explanations, the model specifies complementary mechanisms and identifies where some bypass engagement to exert direct effects on loyalty, clarifying long-standing debates about the relative roles of emotion, routine, and symbolism in consumer-brand relationship strength.

A fourth contribution is the empirical differentiation of habitual loyalty from engaged loyalty within a single structural model. The dominant direct effect of behavioural insight on loyalty demonstrates that repeat choice can be sustained by automaticity even with modest cognitive-emotional involvement, and that behavioural frequency must not be conflated with motivational engagement. This distinction sharpens theory about loyalty quality and cautions against treating observable behavioural traces as sufficient evidence of engaged, resilient consumer-brand relationships.

The findings offer a diagnostic lens for managers to audit and balance the three insight dimensions sustaining loyalty. Brands should assess whether current performance leans too heavily on any single pathway – psychological resonance (attachment, identity alignment, trust), behavioural reinforcement (habit, frictionless choice, visible participation), or creative authenticity (symbolic meaning, narrative immersion) – since over-reliance on any one-dimension risks fragile loyalty. A practical audit would triangulate attitudinal indicators, behavioural traces, and perceptual signals of creativity to identify portfolio imbalances and prioritize investment accordingly.

Creative strategy should be judged primarily by its ability to generate engagement rather than merely awareness or aesthetic preference. Managers should operationalize creative KPIs capturing narrative immersion and participatory response, such as depth of content interactions and quality of user contributions, linking them to downstream loyalty behaviours via experimentation. Campaigns that are distinctive and culturally resonant but fail to activate comments, shares, or co-creation are unlikely to generate durable outcomes. This is particularly relevant for fashion and lifestyle brands, where symbolic resonance and narrative authenticity are primary engagement drivers: content formats that invite co-creation – user-generated styling challenges, brand narrative participation, community storytelling – measurably convert creative impact into the engagement that sustains loyalty.

Psychological strategy should consolidate trust and identity alignment as dual insurance, since both elevate engagement and provide a direct safety net to loyalty. Managers can reinforce this layer through transparent promises, reliable service recovery, and identity-consistent touchpoints. Brand governance should monitor trust moments (privacy, price fairness, product quality) and identity moments (tone of voice, community ethos, symbolic fit). For technology brands, where rapid product cycles, data privacy concerns, and competitive switching are pervasive, this dual monitoring is especially critical, making proactive governance of trust and identity touchpoints a higher-order strategic priority than campaign-level creative investment.

Behavioural strategy should intentionally design for habit without confusing frequency with engagement. Managers should optimize choice architecture (default options, one-tap repurchase, replenishment reminders), loyalty mechanics (status tiers, soft benefits), and omnichannel consistency to stabilize repeat behaviour, overlaying these habit loops with trust cues, identity-relevant messaging, and periodic narrative refresh to defend against commoditization. In fast-moving consumer goods categories, where habitual repurchase is the dominant loyalty mechanism, this overlay strategy is the primary defence against private-label substitution, converting cold routine into warm engagement where possible.

Resource allocation should follow the model's contingent pathways. Where symbolic differentiation is decisive, creative investment raising engagement will be highest leverage. In low-involvement contexts, habit and user experience investments yield more immediate loyalty dividends, provided baseline trust and identity fit are maintained. Portfolio management should periodically rebalance across all three dimensions, reinforcing whichever is the bottleneck and validating changes through tests linking insight shifts to engagement shifts to loyalty outcomes.

Although this study provides strong support for the proposed framework, several limitations create opportunities for further inquiry. First, the cross-sectional design restricts causal inferences about how insights evolve over time or how engagement develops dynamically. Longitudinal or experimental designs would help establish temporal ordering and identify whether insights serve as precursors, reinforcers, or consequences of engagement in different contexts.

Second, the study relies on self-reported perceptions and behaviours, which may be subject to response biases. Future research should complement survey data with objective behavioural indicators – purchase histories, digital traces, platform-level engagement logs – to better distinguish habitual action from motivational involvement and validate the behavioural insight construct with richer evidence.

Third, while tested across a diverse consumer sample, pathway strength may vary across product categories, brand types, or cultural settings, given that habit strength, symbolic meaning, and identity alignment differ across markets. Multi-group comparisons or culturally varied samples could reveal boundary conditions and strengthen generalisability. The boundary conditions suggested by the non-digital context discussion in the preceding section are particularly worthy of investigation: future research should examine whether the dominance of the direct behavioural pathway and the full mediation of creative insight hold in offline or hybrid channel environments, or whether the relative weight of the three insight dimensions shifts substantially when digital platform features are absent.

Finally, future research may explore additional mediators or moderators that refine the model. Constructs such as brand love, psychological ownership, or brand experience may further explain how insight translates into engagement and loyalty, while consumer traits (involvement, need for cognition), brand positioning (hedonic vs. utilitarian), or platform design features may shape the relative dominance of psychological, behavioural, or creative mechanisms across different market contexts.

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