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SPIS TREŚCI

Słowo wstępne

Numer 60. „Zeszytów Naukowych Politechniki Częstochowskiej. Zarządzanie" jest zbiorem ośmiu artykułów naukowych, które podejmują aktualne i zróżnicowane problemy funkcjonowania przedsiębiorstw i organizacji we współczesnym otoczeniu społeczno-gospodarczym. Autorzy reprezentujący różne ośrodki badawcze przedstawiają zarówno wyniki badań empirycznych, jak i pogłębione analizy koncepcyjne, osadzone w aktualnym dorobku literatury krajowej i międzynarodowej. Zawarte w numerze opracowania wpisują się w nurt interdyscyplinarnych badań nad zarządzaniem i jakością, ukazując wielowymiarowość procesów decyzyjnych, organizacyjnych i społecznych. Problematyka artykułów koncentruje się m.in. na zagadnieniach związanych z nowymi podejściami do oceny efektywności pracy, uwzględniającymi wymiar psychospołeczny, z kształtowaniem dynamicznych zdolności organizacyjnych w podmiotach spółdzielczych, a także ze znaczeniem relacji sieciowych w rozwoju przedsiębiorczości społecznej w środowisku miejskim. Istotną część numeru stanowią również analizy odnoszące się do społecznych konsekwencji działalności gospodarczej, w tym percepcji lokalnych społeczności wobec wydobycia surowców strategicznych. Uzupełnieniem tych rozważań są artykuły poświęcone decyzjom inwestycyjnym w sektorze nowoczesnych technologii medycznych; komunikacji marketingowej marek kosmetycznych; roli kultury organizacyjnej w budowaniu przewagi konkurencyjnej oraz znaczeniu determinant cyfrowych dla skuteczności zarządzania w realiach gospodarki opartej na danych. Zebrane w niniejszym numerze publikacje odzwierciedlają aktualne kierunki rozwoju nauk o zarządzaniu i jakości, odpowiadając na potrzebę pogłębionej refleksji nad wyzwaniami transformacji cyfrowej, odpowiedzialności społecznej biznesu oraz zmieniających się uwarunkowań konkurencyjności organizacji. Poruszane zagadnienia mogą stanowić inspirację zarówno dla dalszych badań naukowych, jak i dla praktyki zarządzania w przedsiębiorstwach oraz instytucjach publicznych.

Zespół Redakcyjny składa podziękowania wszystkim Autorom – za zaangażowanie i wkład merytoryczny w powstanie niniejszego numeru „Zeszytów Naukowych Politechniki Częstochowskiej. Zarządzanie", a także osobom uczestniczącym w procesie jego przygotowania. Wyrażamy nadzieję, że przedstawione artykuły spotkają się z zainteresowaniem Czytelników i staną się wartościowym źródłem wiedzy oraz inspiracji do dalszych analiz i dyskusji naukowych.

Redakcja

Preface

Issue 60 of the "Research Reviews of Czestochowa University of Technology. Management" comprises a collection of eight scholarly articles addressing current and diverse problems related to the functioning of enterprises and organizations in the contemporary socio-economic environment. The authors, representing various research centers, present both the results of empirical studies and in-depth conceptual analyses grounded in the current body of national and international literature. The contributions included in this issue are embedded in the stream of interdisciplinary research on management and quality, highlighting the multidimensional nature of decision-making, organizational, and social processes.

The subject matter of the articles focuses, among others, on issues related to new approaches to performance evaluation that incorporate the psychosocial dimension; the development of dynamic organizational capabilities in cooperative entities; and the importance of network relationships in the development of social entrepreneurship within urban environments. A significant part of the issue is also devoted to analyses concerning the social consequences of economic activity, including the perceptions of local communities toward the extraction of strategic raw materials. Complementing these considerations are articles addressing investment decision-making in the medical technology sector, marketing communication of cosmetic brands, the role of organizational culture in building competitive advantage, and the importance of digital determinants for effective management in the realities of a data-driven economy.

The publications collected in this issue reflect current directions in the development of management and quality sciences, responding to the need for in-depth reflection on the challenges of digital transformation, corporate social responsibility, and the changing conditions of organizational competitiveness. The issues discussed may serve as inspiration both for further academic research and for management practice in enterprises and public institutions.

The Editorial Team extends its sincere thanks to all the Authors for their commitment and substantive contribution to the creation of this issue of the "Research Reviews of Czestochowa University of Technology. Management", as well as to all those involved in the editorial process. We hope that the presented articles will meet with the interest of Readers and will become a valuable source of knowledge and inspiration for further analyses and scholarly discussions.

Editorial Board

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INTEGRATION OF THE PSYCHOSOCIAL DIMENSION FOR A NEW PERFORMANCE EVALUATION MODEL

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Abstract: Traditional performance evaluations are insufficient in the face of the challenges of the digital work environment, characterized by automation, remote work, and new psychosocial dynamics. The aim of this article is to substantiate the importance of incorporating a psychosocial-technological dimension into a performance evaluation model that encompasses elements related to the intensive use and adaptation of work scenarios, particularly when advanced technology, characteristic of Industry 4.0, is employed. A mixed approach and a descriptive-propositional analysis were used, supported by a critical theoretical review and the exploration of existing psychometric scales. Six key indicators were defined: digital resilience, adaptation to virtual environments, technostress management, digitalized social support, virtual emotional intelligence, and tolerance to technological frustration. Observable criteria, evaluation levels, and desirable parameters were established for each one. Likewise, their correspondence with eleven recognized scales, such as CD-RISC, PSS, and TEI, was analyzed, identifying partial coincidences and relevant gaps. The findings indicate that current odels overlook the psychosocial effects of technology-mediated work, thereby limiting their diagnostic and ethical utility. It is concluded that incorporating this dimension is crucial to building instruments that are representative, sensitive, and adapted to the complexity of performance in the digital age.

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Introduction

Performance appraisals have long been a key tool in talent management, allowing results to be visualized, development potential to be diagnosed, as well as relationships between employees and managers to be strengthened. Traditionally, these appraisals have been based on quantitative indicators, such as goal achievement or production levels, and structured in formal models, including 360° appraisals or competency-based assessments. However, despite their methodological advances, they continue to focus primarily on observable metrics, overlooking the relational and emotional factors that actually determine performance (Aguinis, 2013; DeNisi & Murphy, 2017).

While automation and artificial intelligence have undeniably transformed tasks, supervisory mechanisms, and interaction patterns, these changes have also exposed workers to new psychosocial conditions, such as overload, insecurity, and technosurveillance (Ragu-Nathan et al., 2008; Tarafdar et al., 2014). The contradiction is evident: digital tools designed to improve efficiency also generate anxiety, fatigue, and isolation, creating a persistent tension between productivity and mental well-being.

This study presents a novel approach to performance assessment that explicitly incorporates a psychosocial-technological dimension, designed to interpret how workers experience and adapt to digitalized work contexts. The proposal goes beyond conventional data-driven methods, seeking to integrate objective performance indicators with emotional, cognitive, and social dynamics. The goal is to develop an evaluative framework that complements human and technological aspects, rather than competing with them, providing organizations with a more ethical, preventive, and adaptive perspective on performance in the digital age.

Theoretical foundations

Performance evaluation: evolution and trends

Traditional performance evaluation models have played a fundamental role in organizational management, are based on functionalist approaches in which individual performance is aligned with the organization's strategic goals. Their purpose is to establish a formal system for making achievements visible and providing feedback on performance. The models have promoted tools such as goal-based evaluation, 360-degree feedback, and competency-based approaches, each with its own logic and scope (Aguinis, 2013; Cardy & Leonard, 2014).

Evaluation by objectives measures the degree of compliance with previously established goals; 360° assessment tries to overcome individual biases by incorporating multiple sources of superior feedback: peers, subordinates, and even clients; the competency-based approach evaluates not only what a person achieves, but how they achieve it, integrating knowledge, skills, and attitudes relevant to each role. Each model seeks to capture different performance dimensions, although they all start from the same assumption: performance can be objectively measured through observable and replicable indicators (Bracken et al., 2001; Spencer & Spencer, 1993).

Nevertheless, this instrumental logic has been the subject of criticism as these models tend to privilege technical variables such as productivity, time management, or leadership, overlooking subjective or contextual aspects that also have a significant influence on performance. Emotional state, the quality of interpersonal relationships, and personal context are factors that modulate daily performance, and ignoring them leads to reductionist evaluations that fail to capture the complexity of human behavior in today's work environments (DeNisi & Murphy, 2017; Sonnentag & Frese, 2012; Fletcher, 2001).

New technologies and their effects on work

The prevailing technological revolution is driving more dynamic and data-centric schemes, in which feedback is no longer episodic but continuous and automated, prioritizing operational traceability over human links and reconfiguring supervision processes. These changes require a critical review of traditional assessment models, which may be insufficient to capture the new realities of digital work (Brynjolfsson & McAfee, 2017; Morgeson et al., 2022).

Nonetheless, permanent feedback and algorithmic surveillance can lead to cognitive fatigue, anxiety, and constant emotional pressure, negatively impacting the well-being of workers. Even though technologies promise efficiency, when their implementation does not consider the human implications, they can lead to dynamics of psychological exhaustion or work isolation (Moore, 2018; Sewell & Barker, 2006).

Five factors, referred to as techno-stressors, have been identified, explaining how certain technology characteristics generate tension in workers (Ragu-Nathan et al., 2008). For his part, Alkahayyal (2024) confirms this original structure that Ragu describes, and situates it as a framework for understanding the psychosocial impact of the digitization of work:

1. Techno-overload: technology requires workers to do more tasks in less time or with greater intensity.
2. Techno-invasion: the intrusion of work into personal life as it allows us to be permanently connected.
3. Techno-complexity: technological tools are challenging to use, which generates frustration and a greater need for learning.
4. Techno-insecurity: the perception that it can replace the worker or make him or her appear less competent.
5. Techno-uncertainty: constant changes or updates that generate confusion or resistance.

Empirical studies have validated these effects, such as techno-overload and techno-invasion, and demonstrated their significant association with decreased productivity, particularly among women and individuals with lower levels of education. Technostress has been found to be associated with decreased job satisfaction, increased burnout, and a loss of digital self-efficacy, particularly in contexts involving hybrid or intensive work on digital platforms (La Torre et al., 2020).

Amin et al. (2024) examine the effects of technostress, including dimensions such as techno-overload and techno-invasion. Techno-complexity, techno-insecurity, and techno-uncertainty regarding the productivity of pre-professionals confirm the significant adverse impact.

Generational gap

Incorporating emerging technologies in work environments does not affect all workers uniformly, and the generation gap is a determining factor in understanding this difference. Younger employees, familiar with digital environments from an early age, tend to develop a greater facility in incorporating technological tools into their work routines, which allows them to adapt with less resistance to technological changes and achieve more organic integration in highly digitized contexts (Morris & Venkatesh, 2000). In contrast, recent empirical research suggests that older workers frequently encounter significant barriers to technological adaptation, which can manifest as frustration, anxiety, insecurity, and resistance to change (An et al., 2024; Hong et al., 2025). These barriers are not only associated with chronological age but also with limited prior digital socialization, which negatively affects self-efficacy and willingness to engage with new tools.

For example, An et al. (2024) found that older adults' negative self-perceptions of aging increased their technology anxiety, which in turn undermined digital self-efficacy and their intention to use new digital services, while Hong et al. (2025) showed that older adults' lower motivational initiative and perceived digital capability hinder their integration into AI-mediated work systems. In this way, the lack of digital familiarity emerges as a psychosocial risk factor that directly impacts emotional well-being and the perception of work competence in technologically mediated environments

Psychosocial dimension in workplace contexts

From the perspective of work psychology, the perception of support or a sense of belonging can be a determinant of performance, alongside technical skills and available material resources (Peiró & Rodríguez, 2008). Job demands, such as workload, time pressure, or technological complexity, can lead to burnout if personal resources, including resilience and team support, are not adequately balanced. The model integrates emotional, cognitive, and relational dimensions, making it a key tool for rethinking performance evaluations in technology-mediated contexts (Bakker & Demerouti, 2007).

Psychosocial factors that influence the work experience have been identified, including:

a) Resilience (Galy et al., 2023).
b) Adaptability (Hoang, 2024).
c) Interpersonal relationships (Roellyanti, 2024).
d) Family and social support (Alkhayyal, 2024).
e) Perceived stress (Zhao & Wu, 2024).
f) Emotional intelligence (Edmund et al., 2023).
g) Frustration tolerance (Wang et al., 2024).

Their exclusion from traditional assessment models hinders a comprehensive understanding of performance in digital environments.

Existing instruments measuring psychosocial factors

An in-depth analysis of existing psychometric instruments was conducted to provide points of comparison and evaluate whether they already incorporate this aspect in practice. The summary of the findings is presented in Table 1, which outlines the instrument, its description, field of application, and limitations in relation to the object of study.

Table 1. Psychosocial instruments: description, applications, and limitations

Instrument	What it measures	Applications / context of use	Missing/ limiting factors
Resilience Scale (CD-RISC) (Connor & Davidson, 2003)	Perceived resilience, the ability to overcome adversity	Environments of high demand, crisis, burnout, and labor turnover	Does not integrate technological stressors or digital adaptability; does not contemplate techno--organizational contexts
Perceived Stress Scale (PSS) (Cohen et al., 1983)	Perception of lack of control, overload, and general stress	Identify emotional exhaustion, work-family conflict, and self-efficacy	Evaluates global stress but omits sources linked to automation, digital monitoring, or continuous connectivity
Job Content Questionnaire (JCQ) (Karasek et al., 1998)	Social support, psychological demands, and autonomy	Detect relational climates and quality of work relationships	Designed for traditional work models; limited sensitivity to hybrid, remote, or AI-assisted environments
Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet et al., 1988)	Perceived support from family, friends, others	Measure work-life balance and resilience to burnout	Does not consider virtual interactions or the dilution of social ties in digital workplaces
Trait Emotional Intelligence Questionnaire (TEIQue) (Petrides & Furnham, 2001)	Emotional intelligence traits: empathy, emotional regulation, and relationship management	Studies on leadership, performance, and interpersonal conflicts	Limited capacity to assess emotional intelligence in human--machine or virtual communication contexts

Instrument	What it measures	Applications / context of use	Missing/ limiting factors
Frustration Discomfort Scale (FDS) (Harrington, 2005; Ozer et al., 2012)	Intolerance to emotional distress, need for immediate gratification	Evaluate emotional regulation and frustration in work environments	Does not capture digital impatience or the stress derived from technological failure or system latency
Work Emotional Climate Scale (ECEL) (Peiró & Latorre, 2004)	Predominant emotions in work teams: anxiety, enthusiasm, satisfaction	Group diagnosis of emotional state, organizational well-being	Focuses on collective emotions but lacks items addressing remote teams or digital collaboration climates
Change Adaptability Scale (CAS) (Martin et al., 2005)	Cognitive flexibility, willingness to adapt to organizational change	Contexts of digital transformation, restructuring	Evaluates change in general but not specific adaptation to emerging technologies or AI-driven processes
Sense of Coherence Scale (SOC-13 y SOC-29) (Antonovsky, 1987)	Perception of environment as understandable, manageable, meaningful	It predicts mental health and resilience to stress in demanding work contexts	Limited by its abstract and generalized nature, it does not isolate digital stress or information overload factors
Emotion Regulation Questionnaire (ERQ) (Gross & John, 2003)	Emotional regulation strategies: cognitive reappraisal, expressive suppression	Identify emotional styles and their impact on performance, relationships	Ignores emotional regulation in technology--mediated interactions, like virtual meetings, AI feedback
Maslach Burnout Inventory (MBI) (Maslach & Jackson, 1981)	Emotional exhaustion, depersonalization, and low personal fulfillment	Burnout studies in helping health professions	Does not incorporate techno-burnout or digital fatigue; may underestimate exhaustion in virtual or hyperconnected roles

Source: Own study based on research

Research methodology

This study aims to integrate a psychosocial-technological dimension into performance evaluation models by formulating critical indicators that reflect the new demands of the digital work environment. To support this objective, relevant constructs are identified to justify the inclusion of a psychosocial dimension within performance evaluations in technologically mediated contexts.

Preliminary measurement criteria were established based on three core elements: (a) conceptual relevance, grounded in their theoretical consistency within current work scenarios; (b) empirical validation, privileging instruments and models previously applied in studies on psychological adaptation to technological impact; and (c) convergence potential, considering their capacity to align with traditional indicators of organizational evaluation.

The selection of literature and analytical references was guided by the authors' practical experience in applying psychometric instruments within organizational contexts. The experiential criterion enabled the identification of indicators capable of effectively measuring psychosocial responses associated with technological adaptation and work performance.

A mixed-methods approach was applied through a sequential design. The qualitative phase involved constructing an analytical framework grounded in specialized literature to identify conceptual gaps and propose six emerging indicators: digital resilience, adaptation to virtual environments, technostress management, digitalized social support, virtual emotional intelligence, and tolerance to technological frustration. Content analysis and thematic coding techniques were used to categorize theoretical patterns and interpret conceptual intersections among psychological, organizational, and technological constructs. The methodological process was structured into four phases: documentary analysis, establishment of indicator relationships, validation of scales, and construction of the proposed model.

Results

The results derived from the documentary work correspond to a conceptual and non-empirical analysis aimed at identifying the relationship between the reviewed theoretical foundations and the selected measurement instruments. They establish correspondences and contrasts between psychological constructs and traditional components of work performance. Based on this analysis, weaknesses in the existing evaluation model were identified, primarily related to the lack of indicators that consider psychosocial aspects in adapting to technological transformation.

These limitations justify the need to integrate a psychological dimension that complements performance evaluation in organizational contexts influenced by disruptive technologies. For analytical organization, digital tools were employed to categorize indicators, visualize conceptual relationships, and maintain traceability between theoretical constructs and selected psychometric instruments.

Four central arguments were developed that support the need for an integrated dimension:

1. Structural Changes in the Work Environment (Aguinis, 2013)
    a) Digital transformation has radically changed working conditions, displacing classic models focused on face-to-face and direct supervision.
    b) Remote work, collaborative platforms, and automation have broken traditional hierarchical logic.
    c) New dynamics require a rethinking of evaluation systems, which have become obsolete due to decentralization and digital surveillance.
2. Gaps in current assessment models (Bakker & Demerouti, 2007)
    a) Current models continue to operate under outdated assumptions, such as face-to-face supervision and a rigid hierarchical structure.
    b) They ignore contemporary phenomena derived from remote work, such as digital fatigue, hyperconnectivity, and isolation.

   c) This limits the ability to correctly diagnose job performance in complex digital contexts.
3. Urgency of a psychosocial-technological dimension (Tarafdar et al., 2014; Luthans et al., 2007; Zimet et al., 1988)
   a) Technology transforms work but generates emotional and cognitive demands that must be evaluated.
   b) Concepts such as digital resilience or virtual social support cannot be measured with traditional instruments.
   c) It is urgent to integrate a dimension that contemplates new psychosocial challenges derived from the technological environment.
4. From the psychosocial to the psychosocial-technological
   a) Classic psychosocial factors are insufficient to explain performance in deeply digitized contexts.
   b) Indicators that articulate emotional, relational, and adaptive aspects in technology-mediated environments are required.
   c) The new dimension must reflect emerging skills such as digital empathy or adaptation to automation.

Table 2. Indicators of psychosocial dimension for techno-digital contexts

Psychosocial factor	Operational definition	Justification
Digital resilience	Ability to maintain emotional and functional stability in the face of technological change and redefinition of tasks	It assesses an individual's resilience to the volatility of digital environments, enabling them to maintain performance under uncertain conditions
Adaptation to virtual environments	Adaptation to remote work dynamics, asynchronous platforms, and technology-mediated labor relations	Remote work has transformed interaction and organizational structures; therefore, it is essential for functional performance
Technostress management	Level of coping with pressures derived from intensive use of digital tools	It directly impacts health and productivity and thus must be incorporated into performance evaluation
Social support in digital contexts	Perception and availability of emotional and professional support networks in virtual environments	Perceived support influences workplace well-being, but its forms and channels have shifted due to digitalization
Emotional intelligence in virtual interactions	Ability to identify, express, and regulate one´s own and others´ emotions	Virtuality distorts emotional cues, making empathy and affective communication more difficult
Tolerance to technological frustration	Emotional response to technical failures, unexpected changes, and inefficient digital demands	Constant exposure to technical issues generates emotional strain that affects day-to-day performance

Source: Own study based on research

Six key indicators were defined to capture the critical dimensions of well-being and performance in technology-mediated work environments, constructed from the specific tensions identified between psychosocial and digital domains (Table 2).

These factors should not be understood as isolated constructs, but rather as an integrated set that responds to a work reality shaped by new forms of interaction, emerging cognitive demands, and novel psycho-emotional risks.

Definition of measurement criteria

The operationalizing of the six previously defined psychosocial-technological indicators to establish a conceptual and practical foundation for their future measurement. For each indicator, observable behavioral criteria, preliminary rating levels, and desirable parameters in the current digital work context were defined.

Digital resilience

a) Responsiveness to technological interruptions or unexpected changes in digital platforms.
b) Sustained work engagement despite technological uncertainty or system failures.
c) Willingness to relearn automated processes or adopt new digital tools without significant emotional deterioration.

Adaptation to virtual environments

a) A level of autonomy in using collaborative digital platforms.
b) A degree of organization and goal achievement in asynchronous contexts.
c) Ability to establish and maintain effective virtual work relationships.

Technostress management

a) Signs of exhaustion or irritability in digital contexts.
b) Frequency of distraction or loss of focus due to digital stimuli.
c) Use of emotional regulation strategies or healthy disconnection habits.

Social support in digital environments

a) Frequency of contact with peers, leaders, or digital mentors.
b) Perceived trust in these relationships.
c) Participation in collaborative networks or digital support communities.

Emotional intelligence in virtual interactions

a) Ability to interpret tone and emotional intent in messages.
b) Adequate emotional regulation during ambiguous or conflictive digital exchanges.
c) Capacity to establish empathic connections via digital platforms.

Tolerance to technological frustration

a) Reactions to technical errors or unexpected interruptions.
b) Degree of perseverance when facing technological difficulties.
c) Frequency of frustration during digital tasks.

Graphical representation of the scoring system and application Simulation

A graphical tool (Annex 1) represents the low, medium, and high levels of each psychosocial-technological indicator using a 1-10 Likert-type scale. This visual format is based on predefined measurement criteria and aims for objectivity by linking score ranges with observable behaviors. Evaluators are encouraged to use the desirable parameters as a reference to guide scoring decisions.

It is essential to note that the tool (Annex 1) is not a validated instrument, but rather a preliminary proposal to support the future operationalization of the indicators.

Annex 2 presents a simulation assigning hypothetical scores to a worker, generating a control chart interpreted using the proposed standards. This example illustrates how indicators may be applied in digital organizational contexts.

Relationship of indicators with existing measurement instruments

To identify elements already evaluated that could inform a future measurement proposal, a cross-analysis was conducted with eleven validated ones; however, relevant gaps remain, particularly regarding asynchronous adaptation, digital social support quality, and tolerance to technological frustration. These findings confirm the need for a specific diagnostic tool tailored to digital work demands, and support the foundation for its future development.

The findings justify the need to design a specialized psychometric instrument based on six proposed psychosocial-technological indicators; these should not be treated as optional, but as a central dimension for understanding how technology impacts emotional, adaptive, and relational aspects of work. Their integration could enhance traditional performance evaluations by incorporating subjective experiences often overlooked in digital environments.

Although developing an instrument would require adherence to psychometric principles and methodological rigor, it would also ensure internal consistency. Each indicator would be supported by observable criteria and rating scales, offering a comprehensive assessment framework.

Recommendations:

1. Design of a dedicated psychometric battery, specific to digital contexts, integrating the six indicators into a single diagnostic tool.
2. Gradual implementation in real work environments, starting with pilot tests in highly digitalized sectors or hybrid work models.
3. Alignment with human talent management practices, such as digital well-being programs, remote emotional support, training in psycho-emotional competencies, and the development of disconnection policies.

4. Development of intervention protocols, based on measurement results, which enable organizations to act preventively in response to early signs of emotional exhaustion, isolation, or poor digital adaptation.

These results showed the feasibility of integrating the psychosocial-technological dimension into future performance evaluations and propose concrete lines of action for its operationalization, validation, and institutional implementation. This study utilized digital tools to distinguish between the treatment of human capital in traditional performance evaluations and that which is necessary in a stage of constant technological change.

Conclusion

This research confirms that digital transformation has introduced working conditions which traditional performance appraisal models fail to address accurately. Elements such as hyperconnectivity and link virtualization have reshaped how workers express their performance. In this context, approaches that focus solely on observable goal attainment become limited, making it essential to incorporate dimensions that capture the subjective and emotional aspects of the experience.

To propose a psychosocial-technological dimension, a methodological route was developed in four phases, allowing progress from the theoretical analysis of the problem to the formulation of concrete indicators. Observable measurement criteria and assessment levels were established for each indicator, along with their link to existing psychometric scales. While points of agreement were found, notable gaps also emerged, especially concerning asynchronous contexts and digitally mediated links.

This study presents the theoretical and technical construction of a psychosocial-technological dimension, not as a complement, but as an essential component for comprehensively evaluating performance. It is proposed that a diagnostic tool based on these indicators be developed, applied in highly digitized environments, and moved towards ethically responsible methodologies which address emotional well-being and the human sustainability of digital work.

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WŁĄCZENIE WYMIARU PSYCHOSPOŁECZNEGO DO NOWEGO MODELU OCENY DZIAŁANIA

Streszczenie: Tradycyjne oceny wydajności są niewystarczające w obliczu wyzwań cyfrowego środowiska pracy, charakteryzującego się automatyzacją, pracą zdalną i nową dynamiką psychospołeczną. Celem niniejszego artykułu jest uzasadnienie znaczenia uwzględnienia wymiaru psychospołeczno-technologicznego w modelu oceny wydajności, który uwzględnia elementy związane z intensywnym wykorzystaniem i adaptacją scenariuszy pracy w warunkach dominacji zaawansowanych technologii, charakterystycznych dla Przemysłu 4.0. Zastosowano podejście mieszane oraz analizę opisowo-propozycjonalną, wsparte krytycznym przeglądem teoretycznym i eksploracją istniejących skal psychometrycznych. Zdefiniowano sześć kluczowych wskaźników: odporność cyfrową, adaptację do środowisk wirtualnych, zarządzanie stresem techno, zdigitalizowane wsparcie społeczne, wirtualną inteligencję emocjonalną i tolerancję na frustrację technologiczną. Dla każdego z nich określono obserwowalne kryteria, poziomy oceny i pożądane parametry. Przeanalizowano również ich zgodność z jedenastoma uznanymi skalami, takimi jak CD-RISC, PSS i TEI, identyfikując częściowe zbieżności i istotne luki. Wyniki pokazują, że obecne modele nie uwzględniają psychospołecznych skutków pracy za pośrednictwem technologii, co ogranicza ich użyteczność diagnostyczną i etyczną. Stwierdzono, że uwzględnienie tego wymiaru jest kluczowe dla tworzenia narzędzi, które są reprezentatywne, wrażliwe i dostosowane do złożoności wydajności w erze cyfrowej.

Słowa kluczowe: ocena pracy, wymiar psychospołeczny, kompetencje technologiczne, stres technologiczny

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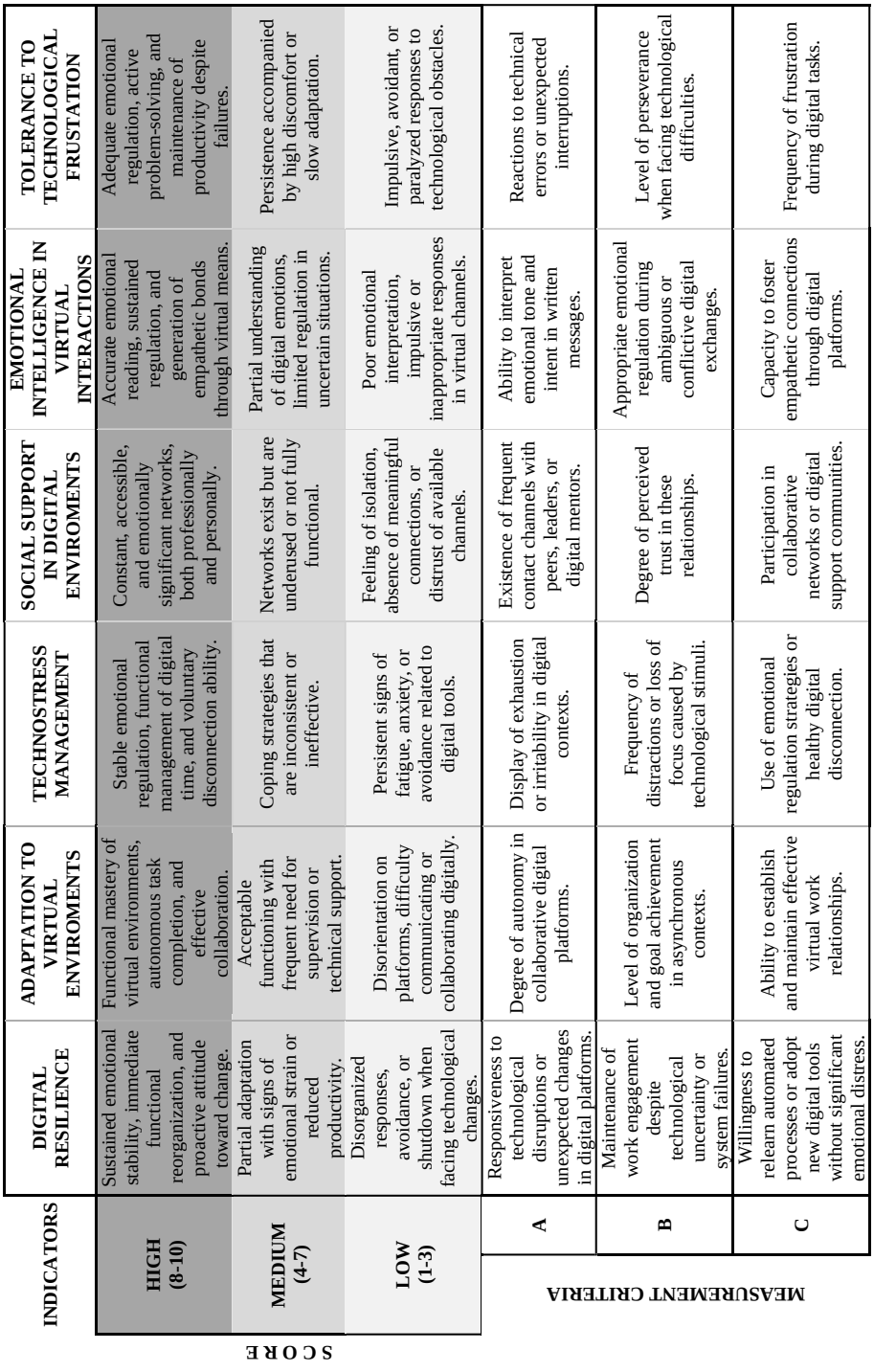
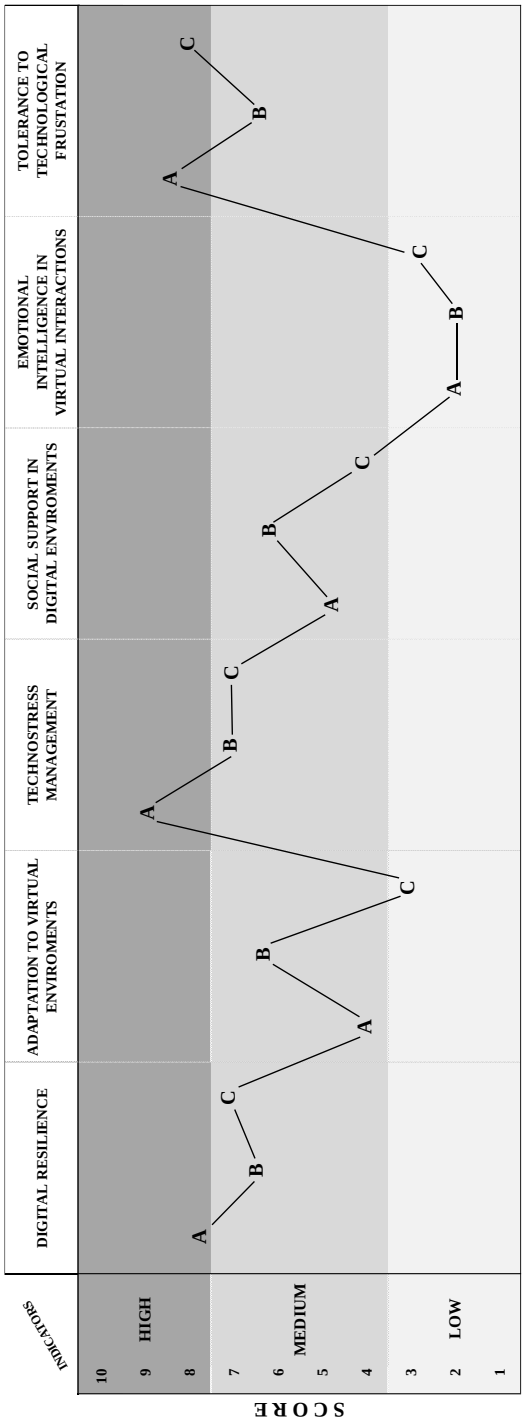
Annex 1



Source: Own elaboration based on the criteria defined in Phase 3.1

Annex 2



Source: Own elaboration for illustrative purposes

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Annex 3

Criteria / Tests		Connor-Davidson Resilience Scale	Perceived Stress Scale	Job Content Questionnaire	Multidimensional Scale of Perceived Social Support	Trait Emotional Intelligence Questionnaire	Frustration Discomfort Scale	Scale of work climate	Change Adaptability Scale	Sense of Coherence Scale	Emotion Regulation Questionnaire	Maslach Burnout Inventory
Digital Resilience	Ability to respond to technological failures	X							X	X		
	Maintaining commitment despite uncertainty	X						X	X	X		X
	Willingness to relearn new tools	X							X	X		
Adaptation to virtual environments	Autonomy on digital platforms			X				X	X	X		
	Organization in asynchronous contexts			X				X	X			
	Effective virtual work relationships			X	X	X		X				
Technostress management	Burnout in digital contexts		X	X				X				X
	Distraction from digital overload		X	X			X	X				X
	Emotional regulation or disconnection					X	X				X	
Social support in digital environments	Frequent contact with peers/leaders			X	X							
	Trust in digital connections				X							
	Participation in collaborative networks				X							
Emotional intelligence in virtual interactions	Emotional interpretation of messages					X					X	
	Emotional regulation in online exchanges					X		X			X	
	Generation of empathic digital connections					X		X				
Tolerance to technological frustration	Reaction to technical errors						X			X		
	Perseverance facing technological difficulties						X			X		
	Frustration in digital tasks		X				X					X

Source: Own study based on research

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NETWORK DYNAMICS OF SOCIAL ENTREPRENEURSHIP IN AN URBAN ECOSYSTEM

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Abstract: Social entrepreneurship in urban environments is deeply influenced by the quality and structure of relationships within its ecosystem. This study analyzes the social entrepreneurship ecosystem in Colonia Roma Norte, Mexico City, to understand how economic and non-economic interactions among actors contribute to (or do not) organizational innovation. The main objective was to identify the key nodes, types of relationships, and exchanges within the ecosystem, and to assess their role in building innovative capacities among social enterprises. A mixed-methods approach was used, with a focus on social network analysis (SNA), complemented by semi-structured interviews and document review. The findings reveal a fragmented yet dynamic ecosystem in which trust-based relationships, cooperation, and information exchange are key catalysts for social innovation beyond formal economic ties. Strategic nodes with high betweenness were identified as critical connectors for inter-organizational collaboration and dissemination of innovative practices. The study concludes that in order to strengthen organizational innovation in social enterprises, it is crucial to foster connection mechanisms within the ecosystem, promote horizontal relationships, and recognize the value of non-economic resources in management processes.

Keywords: network analysis, organizational innovation, social entrepreneurship ecosystem

JEL Classification: L31, O35

Introduction

In recent years, social enterprises have gained global relevance for their ability to address persistent social challenges through market-based approaches that create

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both economic and social value (Defourny et al., 2019; Alter, 2007). Unlike traditional organizations, these hybrid ventures operate at the intersection of philanthropy and profit, seeking financial sustainability while generating social impact. Although the expansion of social enterprises has been well documented in Europe and North America, less attention has been paid to the territorial and relational dynamics that sustain them in Latin America.

Recent scholarship has examined post-pandemic and digital entrepreneurial ecosystems (Pigola et al., 2024), university–community collaborations (Cobo-Gómez et al., 2024), and cooperative networks in urban Mexico (Díaz de León et al., 2024). However, a theoretical gap remains regarding how social innovation emerges from localized networks in which economic and non-economic relationships foster collective learning and organizational innovation. Latin American cases, such as Medellín's Ruta N and Buenos Aires' Design District, demonstrate that cross-sector collaboration and place-based governance can foster inclusive innovation (de Souza et al., 2023). However, few studies have analyzed these dynamics at the micro-territorial level, where daily interactions between social enterprises, creative industries, and civic organizations shape innovation processes.

In Mexico, Martínez and Dutrénit (2017) highlighted inter-organizational learning as a driver of regional innovation, while Orejas and Buckland (2016) traced the institutional foundations of social entrepreneurship. However, the dismantling of the National Institute of Entrepreneurs (INADEM) between 2018 and 2019 marked a critical institutional shift. As the primary federal body promoting entrepreneurship, its disappearance created a policy vacuum that encouraged the rise of decentralized, locally governed ecosystems where universities, social enterprises, and civil organizations assumed leadership roles (Expansión, 2019; Diario Oficial de la Federación, 2019).

This study addresses these gaps by analyzing the urban ecosystem of Roma Norte in Mexico City, a micro-territory characterized by its dense concentration of cultural, creative, and social organizations. Unlike national-level analyses (Villegas-Mateos & Vázquez-Maguirre, 2024), this research focuses on the network structure and relational density of a single urban node, where proximity and shared social values shape innovation. The study reframes social innovation as a relational process, rather than an isolated creative act. It introduces the concept of hybrid governance, illustrating how economic and non-economic ties coexist to sustain collective innovation within urban ecosystems.

Literature review

Definition of social enterprise

Social enterprises have emerged as hybrid entities situated between the for-profit and nonprofit sectors, aiming to address persistent social problems that neither the state, the market, nor traditional civil society organisations have effectively addressed. Their primary characteristic is the social mission that guides them, but they distinguish themselves by using market mechanisms and business approaches to

achieve sustainability. Defourny, Nyssens, and Brolis (2019) define social enterprise as an entity created to mitigate a market failure or solve a social problem, generating social value through business tools such as innovation, strategic orientation, and financial discipline.

From a classic perspective, scholars such as Alter (2007) and Dahik (2018) have proposed several classifications to understand these models, emphasizing that social enterprises operate within the tension between maximizing social impact and maintaining financial sustainability. According to Alter (2007), the diversity of hybrid models reflects the flexibility of the concept, while Dahik (2018) highlights the need for managerial innovation to sustain their dual mission.

More recent studies reaffirm this dual nature while highlighting the adaptive capacity of social enterprises in post-pandemic and digital contexts. For instance, Villegas-Mateos and Vázquez-Maguirre (2024) demonstrate that social enterprises in upper-middle-income countries, such as Mexico and Chile, utilize market mechanisms to address inequality and environmental challenges while ensuring financial viability. Similarly, Pigola, Fischer, and Moraes (2024) demonstrate how Latin American social enterprises are increasingly embedded within digital entrepreneurial ecosystems, using technology and online collaboration to strengthen their impact and resilience. From a broader perspective, Gonçalves, Marques, and Leite (2023) point out that hybrid organizational models are evolving towards networked and innovation-driven logics, linking social value creation with urban and institutional ecosystems.

These organizations typically share three core characteristics: a clear social purpose, a business management approach, and an orientation toward the common good, which may or may not be reflected in their legal structure. In Latin America, particularly in Mexico, social entrepreneurship has gained significant relevance in recent years, albeit in diverse forms and structures. According to Bosma et al. (2015), in Latin America, 15.2% of operational social enterprises focus on commercial activities, 2.3% operate on a philanthropic logic, and only 0.8% adopt hybrid models, reflecting the predominance of business-oriented models with a social purpose.

This tension is also reflected in regional differences: while in Europe the concept of social enterprise is often linked to the social and solidarity economy, in Latin America it is more frequently associated with entrepreneurship and social innovation. These cultural, institutional and legal differences complicate a universal definition of the term, although they share a transformative vision of the role that organizations can play in addressing social challenges.

Urban innovation ecosystems

The concept of an ecosystem applied to the organizational realm originates from biology, where it is used to describe a dynamic system of interdependent relationships between organisms and their environment. This approach was adopted in the 1990s by the management and business literature to explain institutional transformations driven by technological development and interconnectivity within business networks (Ramírez et al., 2020). According to Moore (1993), as cited in Ramírez et al.

(2020), business ecosystems can be understood as communities organized around finite resources, in which the relationships between actors determine the survival, adaptation, and innovation of the productive system.

Over time, the ecosystem concept evolved to analyze how specific geographic environments, especially urban ones, facilitate innovation processes through constant interaction among multiple actors. Thus, innovation ecosystems are understood as local communities in which companies, universities, governments, social organizations, and investors interact to create, adapt, and spread new ways of solving problems (Hoffecker, 2019). Within this framework, Tedesco and Serrano (2019) identify six types of key actors: articulators, facilitators, linkers, knowledge generators, promoters, and communities.

The configuration of these ecosystems depends on interactions among individuals, organizations, and institutions, with the entrepreneur serving as a central actor in system dynamization (Borissenko & Boschma, 2017). In urban contexts, geographical proximity encourages the creation of collaborative networks. Tanimoto (2008) proposes the concept of a social innovation cluster to describe the accumulation of organizations that, through cooperative and competitive relationships, generate innovative solutions to social problems. Thus, urban innovation ecosystems consolidate as living platforms that enable the collective construction of social value through cross-sector collaboration.

Relationship between networks and innovation capacity

Collaborative networks within a social entrepreneurship ecosystem play a fundamental role in developing organizational capacities focused on innovation. Han and Shah (2019) argue that the ecosystem helps enhance the social impact of the companies within it, to the extent that these organizations depend not only on internal factors, such as organizational culture or the skills of their teams, but also on external factors available in their environment, such as public policies, infrastructure, funding and collaborative networks.

It is precisely through these inter-organizational relationships that knowledge exchange occurs, strengthening innovative capacities. Spigel and Harrison (2018) argue that both economic and non-economic relationships in innovation ecosystems follow a logic deeply tied to the entrepreneurial process, in which the local culture must value risk-taking, collective learning, and innovation as core principles.

Under this logic, peer networks, informal mentoring, role models, and mutual support among social entrepreneurs constitute the pillars of ecosystem functionality. In the urban context of Mexico City, social innovation in social enterprises can manifest itself at three levels: incremental, institutional, and disruptive, as proposed by Nicholls et al. (2015).

Incremental innovations address market failures through the introduction of new products or services; institutional innovations reconfigure existing structures; and disruptive innovations radically transform entire systems. In this environment, non-economic relationships – such as knowledge exchange, cooperation at events, or informal collaboration – coexist with economic relationships related to market

transactions or employment. Both types of interaction strengthen the network by encouraging socially innovative and sustainable business models that are adapted to contemporary social challenges.

Methodology

This study adopts a mixed-methods approach with a correlational and explanatory design. The correlational component identifies relationships between two key variables in the urban social innovation ecosystem: economic links (commercial and labor) and non-economic links (collaboration, information exchange, and informal alliances). The aim is to determine how these relationships influence knowledge exchange and the generation of social innovation. According to Hernández, Fernández, and Baptista (2010), correlational studies "evaluate the degree of association between two or more variables [...] and quantify and analyze the linkage" (p. 81). The explanatory component complements this analysis by examining the conditions under which these processes strengthen organizational innovation capacities.

The temporal scope (2001-2018) corresponds to the period in which the social entrepreneurship and innovation ecosystem of Mexico City consolidated, following the arrival of Ashoka and the creation of accelerators such as New Ventures. The reports of the Mexican Impact Investment Alliance (2018) and the Scientific and Technological Advisory Forum (2018) identify these years as the phase of institutionalization and expansion of social innovation and impact investment networks in Mexico.

The case study focuses on the Roma Norte neighborhood, a strategic urban node where various actors converge, including investment funds, private organizations, NGOs, universities and media. Actor selection was based on secondary sources, such as Disruptivo.tv (2020) and the aforementioned reports, prioritizing active organizations between 2001 and 2018.

Using the relational boundary criterion and the snowball sampling method (Verard & Martí, 1999), the study mapped interorganizational connections until saturation was achieved. Data collection included structured observation, surveys, and 22 semi-structured interviews with representatives of social enterprises, NGOs, investors, and intermediaries.

A Social Network Analysis (SNA) visualized the ecosystem structure and measured degree centrality, cohesion, and betweenness. The variables included the type, frequency, and duration of the ties. Quantitative SNA results guided the selection of key actors for qualitative interviews, while insights from these interviews refined the quantitative interpretation, linking network patterns with organizational narratives.

This sequential triangulation strategy allowed for a comprehensive understanding of the ecosystem. The quantitative analysis captured structural configurations, whereas the qualitative component revealed the meanings and motivations that sustain collaboration. Together, both methods explain how relational dynamics and organizational learning processes drive social innovation in an urban context.

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Results

Social enterprise ecosystem in Colonia Roma Norte

The methodological design of this project included an initial phase aimed at identifying the business network of social enterprises applying social innovation in Mexico City. Based on the ecosystem approach, 37 relevant actors were identified, including investment funds, social enterprises, B Corporations, higher education institutions, consulting firms, international organizations, and specialized media outlets. This identification was based on the *Censo de Empresas Sociales* (Census of Social Enterprises) conducted by Disruptivo.tv in collaboration with higher education institutions. The census confirmed that approximately half of the 350 social enterprises identified in Mexico are located in the capital, which supports the presence of an active and geographically concentrated urban ecosystem.

Conceptual frameworks on innovation ecosystems guided the selection of actors. They drew from sources such as Disruptivo.tv (2020), the Mexican Impact Investment Alliance (2018), and *Foro Consultivo Científico y Tecnológico, A. C.* [Scientific and Technological Advisory Forum] (2018). The actors were delimited by agglomeration between 2001 and 2018, with 19 located in Mexico City and 11 specifically in Colonia Roma Norte. Of these, 38% are B corporations, 17% provide investment funds, and 9% are international organizations. Table 1 presents a representative selection of the identified cluster actors:

Table 1. Selected cluster actors

Company Name	Role in the Cluster
Ashoka	Non-governmental organization
Make Senses	Private organization
Impact Hub	Private organization
Sistema B	Private organization
Promotora Social	Company
New Venture	Investment fund
Social Lab	Private company
Svx México	Investment fund
Esmex	Business incubator

Source: Own elaboration based on Disruptivo.tv (2020); Mexican Impact Investment Alliance (2018); and Foro Consultivo Científico y Tecnológico, A. C. (2018)

Colonia Roma Norte stands out as an ideal environment for the concentration of such initiatives. Its strategic location, the density of cultural and creative services, and the availability of human capital offer favorable conditions for the formation of collaborative networks (Semetiel & Noguera, 2004; Spigel & Harrison, 2018). According to Guadarrama and Moreno (2019), the Roma-Condesa corridor functions

as an alternative cultural space that fosters interpersonal and economic ties between organizations. This spatial proximity translates into constant opportunities for interaction, as illustrated by a statement collected from SVX Mexico: "An absolute networking advantage in Mexico City, absolute. In the same building I was in, there was Cirklo, and upstairs, Hispanic without Philanthropy, who ended up hiring us for two or three things."

This spatial dynamic has facilitated the consolidation of a community that not only shares physical space but also a narrative of social impact, collaboration, and entrepreneurship – Figure 1, generated in Atlas.TI 9 illustrates the advantages perceived by the actors of being located within this urban ecosystem.

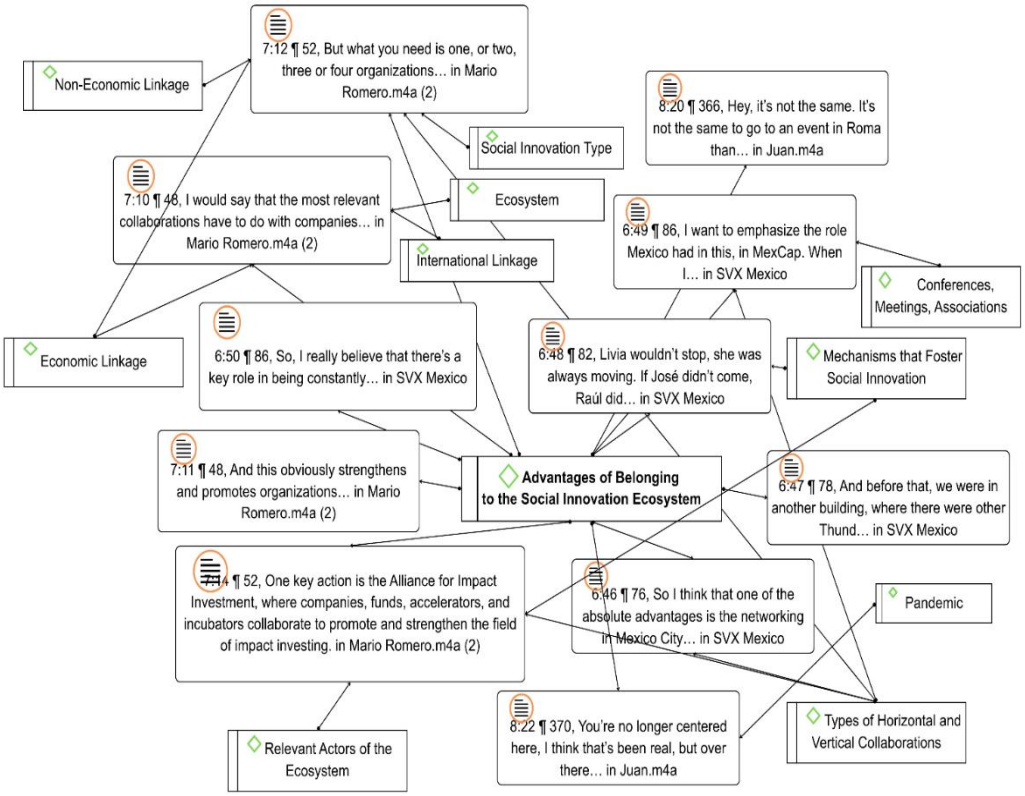

Figure 1. Citation Network – advantages of being based in Mexico City according to interviewed actors

Source: Author's elaboration using Atlas.TI 9, n.d., citations related to the advantages of being based in Mexico City

Figure 1 shows the network of coded quotations generated in Atlas.TI 9, illustrating the multi-layered relationships that define the social innovation ecosystem in *Colonia Roma Norte*. The diagram highlights labels such as Economic Linkages, Non-Economic Linkages, International Linkages, Type of Social Innovation, Ecosystem, Advantages, Mechanisms that Foster Social Innovation, and Types

of Horizontal and Vertical Collaborations. These categories reveal how geographical proximity within Roma Norte enhances cooperation, knowledge exchange, and cross-sector interaction more strongly than in other, more dispersed ecosystems. Spatial clustering of actors, such as SVX México, Impact Hub, and Sistema B, encourages frequent face-to-face encounters and trust-based collaboration, thus amplifying the diffusion of knowledge and enhancing the capacity for innovation. Unlike ecosystems based on distant or digital connections, the Roma Norte cluster demonstrates how urban space itself catalyzes relational density, positioning this neighborhood as a vibrant, open, and continually evolving node of social and organizational innovation in Mexico City, Relational and Informational Functioning of the Social Innovation Ecosystem in Colonia Roma Norte.

The Roma Norte ecosystem of social enterprises exhibits a complex network of non-economic relationships rooted in trust, cooperation, and knowledge exchange. As Hoffecker (2019) notes, ecosystems act as local communities that provide resources and infrastructure for innovation. In this case, diverse actors participate simultaneously in both impact investment and fintech communities, reflecting the characteristics of an urban ecosystem that fosters social solutions through interconnected relationships. According to Han and Shah (2019), these links not only strengthen individual organizations but also contribute to collective co-evolution aimed at achieving social impact.

In addition to symbolic or learning-based relationships, economic relationships were also observed, including service contracting, the formation of strategic alliances, joint fund management, and collaboration in public policy design. These actions aim to strengthen impact measurement methodologies, incubate new social enterprises, and scale sustainable business models.

From a social network analysis perspective, the density values obtained in Table 2 provide critical insight into how knowledge circulates and innovation emerges within the Roma Norte ecosystem. A higher density in the *seeking social innovation resources* network (0.4636) indicates frequent exchanges and strong relational cohesion between actors. It means that the members are not only connected but also actively participate in the transfer of tacit knowledge, such as methodologies and impact indicators, which supports continuous learning and problem-solving. The moderate densities observed in the cooperation networks (0.3818) and business information (0.3272), on the other hand, suggest a structure that balances stability with openness, enabling both trust-based collaboration and the entry of new ideas and partners.

These patterns align with theoretical discussions on ecosystems and social innovation that emphasize the dual importance of cohesion and diversity (Spigel & Harrison, 2018; Hoffecker, 2019). High-density networks tend to promote incremental innovation by facilitating the rapid diffusion of best practices and strengthening shared values among actors. However, the presence of moderately dense networks also prevents cognitive lock-in, allowing the ecosystem to remain adaptive and responsive to emerging challenges. As shown in Table 2, the high density of the consultation network (0.4636) empirically illustrates this balance between cohesion and adaptability, supporting Hoffecker's view of ecosystems as "living infrastructures"

in which relational intensity sustains innovation. In this sense, the Roma Norte ecosystem reflects a dynamic equilibrium between embedded trust and structural flexibility, in which innovation emerges from the interplay between localised collaboration and external connectivity.

Table 2. Density of non-economic relationships

Network	Density
Seeking social innovation resources	0.4636
Cooperation links	0.3818
Business-related information	0.3272

Source: Own elaboration based on data provided by UCINET 6.7

Figure 1 visualizes the relational structure of the Roma Norte social innovation ecosystem, highlighting the strategic positioning of organizations such as SVX México, Impact Hub, and Sistema B. The sociogram reveals a dense, interconnected network in which Impact Hub and SVX México have the highest outdegree (9), reflecting their roles as active seekers and disseminators of knowledge. At the same time, Sistema B stands out with the highest indegree (7), confirming its position as a key reference for impact certification and social accountability.

As illustrated in Figure 2, this pattern reinforces the findings in Table 2, showing how relational density and bridging roles maintain the hybrid nature. The circulation of knowledge, methodological consulting, and collaborative design processes replace purely competitive dynamics, fostering a cooperative environment in which innovation emerges through interaction and mutual learning. Therefore, the network not only represents connections but also visualizes a governance structure rooted in trust, reciprocity, and shared purpose, core features that distinguish social innovation ecosystems from traditional entrepreneurial networks.

The Roma Norte ecosystem differs from conventional entrepreneurial ecosystems that prioritize technological advancement and market performance. Here, greater emphasis is placed on actors that formalize and disseminate social innovation methodologies, such as Ashoka, Makesense, and Sistema B, providing structured frameworks for scaling impact and professionalizing social entrepreneurship. These findings advance ecosystem theory by demonstrating that innovation emerges not only from technological infrastructure or institutional support (Spigel & Harrison, 2018; Hoffecker, 2019), but also from relational density and localized trust, which enable knowledge co-production.

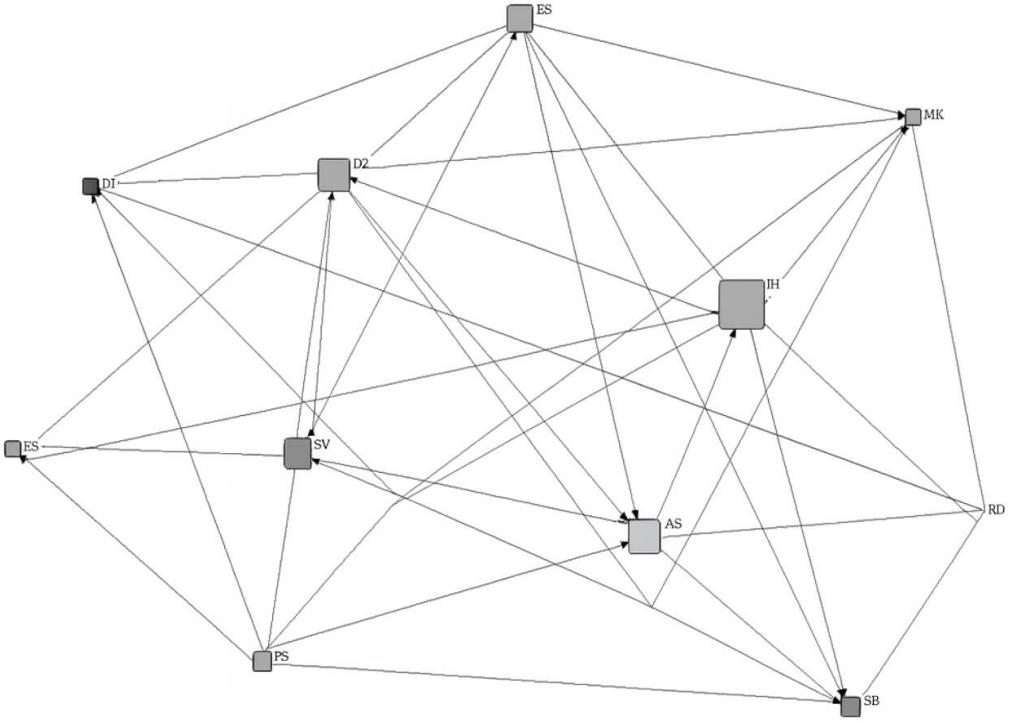

Figure 2. Degree Centrality – network of consultation on social innovation tools

Source: Own elaboration based on research data and using Netdraw

The Roma Norte ecosystem differs from conventional entrepreneurial ecosystems that prioritize technological advancement and market performance. Here, greater emphasis is placed on actors that formalize and disseminate social innovation methodologies, such as Ashoka, Makesense, and Sistema B, providing structured frameworks for scaling impact and professionalizing social entrepreneurship. These findings advance ecosystem theory by demonstrating that innovation emerges not only from technological infrastructure or institutional support (Spigel & Harrison, 2018; Hoffecker, 2019), but also from relational density and localized trust, which enable knowledge co-production.

Recent scholarship reinforces this shift: for example, Villegas-Mateos and Vázquez-Maguirre (2024) describe "social entrepreneurial ecosystems in upper-middle-income countries" with hybrid economic/social logics, and Pigola et al. (2024) highlight the post-pandemic adaptability of social enterprises within digital and collaborative environments. The hybrid configuration observed, where economic exchange and social collaboration coexist, demonstrates that social innovation depends on both tangible resources and symbolic capital.

From a theoretical point of view, these findings expand existing frameworks on social innovation ecosystems, demonstrating how localized interactions foster hybrid governance structures, as noted by Hoffecker (2019), Spigel and Harrison (2018),

and Nicholls et al. (2015), by providing empirical evidence that operationalizes concepts often treated abstractly. Building on Hoffecker's notion of ecosystems as local communities that combine actors, infrastructure, and resources, the findings demonstrate how innovation diffusion occurs through relational properties. The highest-density network (0.4636), which focuses on consulting social innovation tools, reveals that knowledge circulation is a structural phenomenon, sustained by trust and collaboration. Within this structure, Impact Hub and Sistema B act as relational bridges, translating abstract methodologies into operational routines.

Furthermore, the findings align with Spigel and Harrison (2018), who emphasize the role of local culture and horizontal learning. This study expands their framework by demonstrating that local culture, expressed through proximity and daily collaboration, can be operationalized as relational capital. This network of connections fosters learning, as shown by 43% improving impact models and another 43% innovating business design. Hence, the culture of innovation becomes measurable through network behavior, linking social interaction to concrete outcomes.

Following Nicholls et al. (2015), the Roma Norte case offers a relational reinterpretation of social innovation typologies. Incremental innovations arise from dense networks of consultation and cooperation; institutional innovations emerge from the standardization processes led by certifying organizations, such as Sistema B; and disruptive innovations emerge through multi-actor collaborations that connect finance, knowledge, and policy. These patterns suggest that the degree and configuration of relational bonds can serve as indicators of innovation type and maturity.

More broadly, the coexistence of economic (alliances, contracting, fund management) and non-economic (cooperation, methodological exchange, peer learning) relationships reveals the hybrid nature of urban ecosystems. This challenges Eurocentric models centered on state-driven innovation by demonstrating that, in Latin America, institutional gaps, such as the dissolution of INADEM in 2019, have catalyzed bottom-up governance models in which civil society, academia, and enterprises assume coordination roles. This empirical perspective contributes to decolonizing innovation studies by situating Latin American urban ecosystems as laboratories for adaptive and community-driven innovation. Thus, relational capital emerges as the core mechanism through which social innovation becomes adaptive, collaborative, and territorially embedded.

Finally, this study invites a theoretical shift: understanding innovation not as a static product, but as a dynamic property of networks, a function of their capacity to connect diverse actors, share knowledge, and adapt collectively to change.

Conclusion

The analysis of the social innovation ecosystem in Colonia Roma Norte, Mexico City confirms that urban environments can serve as fertile platforms for collaboration, collective learning, and the generation of solutions to social problems. The study of economic and non-economic networks among 37 actors reveals that inter-organizational relationships, grounded in mutual trust, play a decisive role in strengthening organizational capacities and fostering sustainable social innovation.

The presence of B Corps, investment funds, support organizations, universities, and collaborative hubs indicates that Roma Norte has achieved a degree of maturity that enables coordination across diverse sectors, a hallmark of consolidated urban ecosystems (Hoffecker, 2019; Tedesco & Serrano, 2019). Consistent with Borissenko and Boshma (2017), social entrepreneurs function as catalysts of systemic change whose effectiveness depends on the institutional environment and the quality of their relational networks.

These findings are especially relevant in the context of the institutional transformation. The dissolution of the National Institute of the Entrepreneurs (INADEM) in 2019 marked a turning point in national innovation policy, dismantling a key structure for supporting entrepreneurship and social innovation (Expansión, 2019; Diario Oficial de la Federación, 2019). In the absence of this federal actor, Roma Norte emerged as a self-organized ecosystem in which civil organizations, universities, and social enterprises assumed coordination and knowledge transfer functions. This process illustrates the emergence of hybrid urban governance, in which collaboration replaces centralized policy instruments and reinforces bottom-up innovation.

From a theoretical perspective, this study advances existing frameworks on social innovation and urban ecosystems in three ways. First, it redefines social innovation as a relational phenomenon, demonstrating that innovation arises through interaction and collective learning, rather than isolated creativity. Second, it introduces the concept of hybrid governance, demonstrating how economic and non-economic relationships coexist to sustain coordination and knowledge exchange. Third, it provides recent empirical evidence from Latin America that enriches the understanding of how proximity, cultural identity, and informal networks shape urban innovation (Gonçalves et al., 2023; Pigola et al., 2024; Villegas-Mateos & Vázquez-Maguirre, 2024).

These findings highlight the need to design local instruments to support urban innovation ecosystems, such as incubators, innovation hubs, and social impact laboratories, that serve as platforms for collective coordination. Reactivating or creating post-INADEM funding programs focused on collaborative social innovation could strengthen territorial cooperation. Additionally, promoting multi-stakeholder governance mechanisms and specialized training in social innovation tools would enhance ecosystem resilience and scalability. Funding schemes that prioritize collective impact over individual performance could further stimulate sustainable innovation.

The scope is limited by its temporal range (2001–2018) and its geographical focus on a single urban district. Data, based on self-reported relationships, may reflect biases in perception. Future studies should extend this analysis to compare multiple urban ecosystems, such as Medellín's *Ruta N* or Buenos Aires' *Design District,* to identify patterns of hybrid governance and relational density. Longitudinal research could also explore how digitalization, artificial intelligence, and post-pandemic governance reshape collaboration and innovation in Latin American cities.

In summary, the case of Colonia Roma Norte demonstrates that inter-organizational relationships, both economic and social, constitute the backbone of sustainable social innovation. Trust, proximity, and cooperation consolidate a hybrid governance

model that enables urban ecosystems not only to respond to social challenges but also to innovate in addressing those challenges, contributing to more inclusive and context-sensitive theoretical and policy frameworks for the Global South.

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PRZEDSIĘBIORCZOŚĆ SPOŁECZNA W EKOSYSTEMACH MIEJSKICH: ANALIZA SIECI I RELACJI NA RZECZ ORGANIZACYJNEJ INNOWACJI SPOŁECZNEJ

Streszczenie: Przedsiębiorczość społeczna w środowiskach miejskich jest silnie uwarunkowana jakością i strukturą relacji w obrębie ekosystemu. Niniejsze badanie analizuje ekosystem przedsiębiorczości społecznej w Colonia Roma Norte w mieście Meksyk, aby zrozumieć, w jaki sposób interakcje ekonomiczne i pozaekonomiczne między podmiotami przyczyniają się (lub nie) do innowacji organizacyjnych. Głównym celem była identyfikacja kluczowych węzłów, rodzajów relacji i wymian w ekosystemie oraz ocena ich roli w budowaniu potencjału innowacyjnego wśród przedsiębiorstw społecznych. Zastosowano podejście mieszane, ze szczególnym uwzględnieniem analizy sieci społecznych (SNA), uzupełnione wywiadami półustrukturyzowanymi i analizą dokumentów. Wyniki ujawniają rozdrobniony, ale dynamiczny ekosystem, w którym relacje oparte na zaufaniu, współpraca i wymiana informacji są kluczowymi katalizatorami innowacji społecznych – wykraczającymi poza formalne powiązania ekonomiczne. Strategiczne węzły o wysokim poziomie pośrednictwa zostały zidentyfikowane jako kluczowe łączniki dla współpracy międzyorganizacyjnej i upowszechniania innowacyjnych praktyk. Badanie dowodzi, że dla wzmocnienia innowacji organizacyjnych w przedsiębiorstwach społecznych kluczowe jest wspieranie mechanizmów połączeń w ekosystemie, promowanie relacji horyzontalnych i docenianie wartości zasobów pozaekonomicznych w procesach zarządzania.

Słowa kluczowe: analiza sieciowa, innowacyjność organizacyjna, ekosystem przedsiębiorczości społecznej

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GENERATING DYNAMIC ORGANISATIONAL CAPABILITIES IN INTERVENTION STAGE OF A MANAGEMENT MODEL: EVIDENCE FROM COOPERATIVES IN JALISCO

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Abstract: This paper outlines a strategy designed to enhance the dynamic capabilities of cooperatives specialising in the tourism and fishing services in Jalisco, Mexico. This is the second article in a series developed from a project aimed at designing and implementing a management model to promote business development in rural areas of Jalisco. The initial article outlined the model's framework and shared early findings. At the outset, the cooperative members had limited academic backgrounds, resulting in gaps in organisational management capabilities, challenges in effective teamwork, and deficits in empathy and solidarity. As a response, the strategy prioritised training and support for the cooperatives, focusing on the development of organisational skills by means of accessible tools designed to strengthen their dynamic capabilities. The results demonstrated considerable progress in organisational management and the development of new business lines, contributing to the success of these cooperatives.

Keywords: business development, cooperatives, dynamic organisational capabilities

JEL classification: L31, M14, O30

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Introduction

The importance of cooperatives in the local economies of communities is undeniable; they are agents that contribute to the well-being of their members and the general population (European Economic & Social Committee, 2012; Sánchez et al., 2020). However, the challenges they face in remaining competitive in the market are numerous and varied, with the main ones related to human talent, management, a lack of business philosophy, inadequate brand image and advertising, in addition to a lack of adaptation and strategic planning (García et al., 2024).

It is essential to emphasise the significance of dynamic capabilities and their connection to cooperatives, as outlined by Teece et al. (1997). They describe these capacities as a combination of organisational, technical, service, administrative, leadership, and decision-making skills that an organisation can develop. Research on cooperatives in Jalisco, Mexico, has documented their presence across various sectors, including artisanal production, tourism, and fishing (Maldonado et al., 2015; González, 2020; Aranda et al., 2023).

There are gaps in research on the social and organisational factors that affect cooperatives, particularly in the formation and functioning of dynamic capabilities. There is a lack of studies that provide quantifiable measurements of social impact, the development of the social entrepreneurship process in cooperatives, as well as cooperative failure and its manifestations (Camargo Benavides & Ehrenhard, 2021; ICA, n.d.). Although there are isolated studies in Mexico and Latin America, evidence is lacking on how social cohesion, governance, internal structure, partner participation, and institutional networks affect their adaptation and competitiveness (Domínguez-Aguirre et al., 2025; González, 2020; Lajara-Camilleri & Server-Izquierdo, 2017).

This paper presents the third stage of five (diagnosis, design, intervention, evaluation, and continuous improvement) in the management model designed to promote business development in rural areas of Jalisco. Specifically, it focuses on the intervention stage, which involved training and support for business growth across four work teams of the cooperative "Las Puertas de Calderón" S.C. de R.L., located in the town of Plan de Calderón, within the municipality of Zapotlanejo, Jalisco, Mexico. The stages of the model are: in the first stage, a diagnosis of the problems of the cooperative is developed, in the second stage, the techniques and tools of accompaniment for the success of the project are developed together with the cooperative and the decision makers, while in the intervention stage, the techniques and tools of stage two are implemented. Subsequently, in stage four, the results are evaluated, and a comparison is made with the initial plan to build an action plan for improvement in stage five, thereby turning the application into a virtuous circle of business growth. The originality of the study lies in the fact that this phase is not limited to task execution but also promotes participatory intervention in which the members of the cooperative are active agents of change, who appropriate management tools and strengthen their business capacities through practice.

This study hypothesises that, through the implementation of this model – particularly the intervention stage for business development – dynamic capabilities can

be generated to enhance organisational efficiency and, in the medium and long term, improve the cooperative's conditions in addition to the well-being of its members, potentially benefiting their wider environment as well.

Literature review

Cooperatives and their impact

Cooperatives are a particular form of organisation based on the principles of associationism, but with a business structure and an economic and social purpose, centred on people and based on values. According to the International Cooperative Alliance [ICA], a cooperative is "an autonomous association of people who have voluntarily come together to address their common economic, social, and cultural needs and aspirations through a jointly owned and democratically controlled enterprise" (ICA, 2025, p. 2). For the European Economic and Social Committee et al. (2012), cooperativism is an advanced form of economic associationism and therefore "cooperatives constitute the first major business agent of the social economy" (p. 27).

Contribution of cooperatives to the economy

Cooperativism fulfils economic and social functions (García et al., 2024) as well as contributes to the socioeconomic well-being of its members (Sánchez et al., 2020). There are more than three million cooperatives worldwide, representing approximately 12% of the population, and they employ around 10% of the workforce (ICA, 2025; Acosta, 2022). In Mexico, more than eight million members are registered in 18,038 cooperatives. Nevertheless, participation is unequal, and only 7.39% of the population belongs to one (La Coperacha, 2021), highlighting the importance of the cooperative financial sector in the country, which comprises 154 cooperatives and 8.6 million members (World Council of Credit Unions, 2023).

Other cases of cooperatives

Cano et al. (2012) highlight that organisational and technological capacity are key for fishing cooperatives in Balancán, Tabasco. By pointing to the San Pedro cooperative as the most prepared to innovate, they demonstrate that the combination of technification and organization enables fishers to address economic and environmental challenges through comprehensive projects. Domínguez-Aguirre et al. (2025) distinguish between survival and competitiveness in their study of fishing and tourism cooperatives in Jalisco, emphasizing that strengthening the internal structure and members' commitment are essential for consolidating and maintaining cooperatives. For their part, Peteán & Cappato (2011) studied artisanal fishers from cooperatives on the Paraná coast, who are vulnerable and low-income.

The challenges that cooperatives face in remaining competitive

García et al. (2024) explain that the challenges faced by cooperatives to become competitive are related to a) interfunctional and interpersonal coordination since it implies coordination among their members, and b) administrative problems; c) market versus production orientation since cooperatives are more production--oriented than market-oriented; d) risk aversion and a lack of brand image, and e) misalignment between planning, organisation, and the scope of activity. In this regard, Sánchez et al. (2020) explain the main problems that restrict their competitive capacity: poor market prospects, only a short-term focus, poor market intelligence, a lack of knowledge and exploitation of their core skills, in addition to a lack of the ability to insert themselves into collaborative networks that allow them to create production chains and innovate. According to Lajara-Camilleri and Server-Izquierdo (2017), agri-food cooperatives can improve their competitiveness by applying key management principles.

Dynamic capabilities

In the late 1980s and early 1990s, Porter (1980) shifted the focus of competitive advantage analysis to the internal aspects of the firm, focusing mainly on the exploitation of unique internal resources and capabilities (Penrose, 1959; Nelson & Winter, 1982; Wernerfelt, 1984; Hamel & Prahalad, 1990; Mahoney & Pandian, 1992; Peteraf, 1993). These studies conceptualise the company in terms of its resources, organisational competencies, and capabilities. Wernerfelt (1984) points out that resources can be identified as inputs into the company's operations, whether in manufacturing or personnel, and as intellectual capital reflected in employees' capabilities or competencies. The important thing is to recognise that, on their own, they do not generate value except through interaction with organisational capabilities, if they meet the following characteristics: they are difficult to imitate by competitors, valuable, rare, and difficult to replace (Barney, 1991). As for dynamic capabilities, they have their origin in Schumpeter's (1997) spirit of competition-based innovation. While Teece et al. (1997) are the pioneers in proposing this concept, they argue that dynamic capabilities allow the company to reconfigure its competencies, focusing on those capabilities, skills, competencies, routines or processes that organisations carry out to make internal changes, responding to the external environment, to adapt to the environment. This generates innovative sources of competitive advantage, increasing the company's value. On the other hand, Rueda et al. (2022) argue that their importance lies in their role as a tool to guide the company from its present state to its future. Several definitions of dynamic capabilities are found in the literature, some of which are presented in the following table.

Table 1. Some authors and their key contributions to dynamic capabilities

Authors	Dynamic capability definitions
Nelson (1991)	A group of commitments and methods to achieve the company's objective, in which there must be an innovative component that allows them to continue over time and be competitive.
Collins (1994)	The ability to develop and innovate faster.
Henderson & Cockburn (1994)	Architectural competencies become the models that guide the search for the origins of competitive advantage.
Schumpeter (1997)	Initiatives to propose and implement new combinations of means of production.
Helfat (1997)	The subset of competencies/capabilities that enable the organisation to create new products and processes and respond to changing market circumstances.
Teece et al. (1997)	The organisation's ability to integrate, build, and reconfigure internal and external competencies to respond quickly to changing environments.
Eisenhardt & Martin (2000)	The organisational and strategic routines by which the organisation achieves new configurations of resources as the market emerges, grows, becomes saturated, and declines.
Helfat & Raubitschek (2000)	The ability of companies to innovate and adapt to changes in technologies and markets, including the ability to learn from mistakes.
Lee, Lee & Rho (2002)	A new source of competitive advantage lies in conceptualising how organisations can adapt to environmental changes.
Zahra & George (2002)	Change-oriented capabilities that help organisations re-employ and reconfigure their resource bases to meet customer demands and meet competitor strategies.
Zollo & Winter (2002)	A model that the company uses to generate processes effectively. It is structured and persistent.
Winter (2003)	Capacities that operate to extend, modify, or create ordinary capacities.
Vivas (2005)	Dynamic capabilities are complex, high-level organisational processes that provide the right conditions for modifying and renewing the organisation's assets.
Wang & Ahmed (2007)	The organisation's ability to develop new products and services, adopt new production methods, identify new markets and sources of supply, and establish new organisational forms.
Barreto (2010)	Potential of the firm to systematically solve problems based on its propensity to perceive opportunities and make timely, market-oriented decisions.
Cyfert & Krzakiewicz (2017)	A set of skills, competencies, and routines that provides firms: (a) the ability to analyse the market and the situation of the industry; (b) the ability to reconfigure resources; c) the ability to build relationships; and (d) the ability to respond
Burcharth (2024)	They enable companies to adapt, integrate, and reconfigure internal and external competencies, facilitating their ability to address rapidly changing environments and foster innovation.

Source: Authors' compilation from the literature

Classification of dynamic capabilities

A model composed of four types of dynamic capabilities is proposed: absorption capability, innovation capability, learning capability, and adaptability (Garzón, 2015).

Absorptive capability is the ability of an organisation to recognise the value of new external information, assimilate it, and apply it; it is an internal mechanism that enables the organisation to expand its current knowledge through what it has acquired abroad. Absorptive capability is composed of four dimensions, which are: the acquisition of knowledge, i.e. the ability of organizations to identify and acquire knowledge finalized externally; the ability to assimilate knowledge based on characteristics of knowledge, organizational or alliance characteristics; the ability to transform knowledge speaks of the ability to develop and refine routines; and finally the exploitation of knowledge, which is the use of knowledge as a critical component. Innovation capability refers to the competence to create products or services, including the improvement of existing products or services within a company through the development of new production methods (Acevedo & Albornoz, 2019). According to Garzón (2015), this capability is compared to the active search and exploitation of new and unique knowledge.

Learning capability refers to the ability to create, assimilate, disseminate, and apply knowledge, thereby equipping an organisation's agents to navigate changing environments (Acevedo & Albornoz, 2019). It encompasses both individual and collective learning, resulting from social processes and interactions (Garzón, 2015). Acquisition involves identifying and transferring external knowledge (Garzón, 2018), generation focuses on developing and refining processes, and combination integrates internal and external knowledge to create new insights. The ability to adapt is crucial for organisations, allowing them to continuously develop and apply new knowledge sustainably (Acevedo & Albornoz, 2019).

Other cases of dynamic capabilities

González (2020), based on a census of 10,241 artisanal companies in the state of Jalisco, Mexico, identified 162 dedicated to ceramics, of which only fourteen have managed to internationalise. These cases demonstrate how the combination of tangible resources – family financing, adapted industrial machinery, self-made tools, and glazing techniques – in addition to intangible resources, enables the acquisition of learning skills, practical and traditional knowledge, an international reputation, cultural values, as well as relational networks that translate into sustainable competitive advantages. Meanwhile, Rao et al. (2024) explain that, in the Australian context, dynamic capabilities are entirely related to an organisation's ability to integrate, build, and reconfigure competencies in response to opportunities and threats. The case demonstrates that strategic decisions can be influenced by leadership that encourages innovation, considers forming new alliances, and evaluates existing business models for changes.

Research methodology

This is the second article prepared from the results of a research project designed to develop and implement a management model promoting business development in rural areas of the state of Jalisco, Mexico. In the first paper (Corvera et al., 2025), the model's structure was presented, along with some preliminary results. It explains how the quintuple helix, combined with rural innovation tools, can generate dynamic capabilities in organisations. To this end, a five-stage model was implemented: diagnosis, design, intervention, evaluation, and continuous improvement. In that article, the first two stages were detailed. Therefore, in this work, the third stage of the model is presented: intervention in organisations, focused on accompaniment and the generation of dynamic capabilities for business development. The model was implemented in seven aquaculture and fishing cooperatives across various municipalities in the state of Jalisco over approximately six years, at the request of the contracting institution and driven by scholars interested in monitoring the project's outcomes. Upon completing the collaboration, the work team continued to document and formalize what was done, and part of that is shown here. Of those cooperatives, the one that achieved the best results in terms of organisation, implementation, increased integration among members, and business line profitability was “Las Puertas de Calderón” S.C. de R.L., located in the town of Plan de Calderón, in the municipality of Zapotlanejo, Jalisco, Mexico. For this reason, the selection of this case to present in this paper, based on the criteria for choosing partners, was made by considering all the forty-two members, all of whom were males. They were given a “Service Nucleus” by the state authorities, consisting of infrastructure to provide a space for their primary activity and for complementary activities. This prompted the cooperative to enhance its skills in order to launch the venture. It was then that, from the University Centre for Economic-Administrative Sciences (CUCEA) of the University of Guadalajara (UdeG), a multidisciplinary group was formed to address this situation, designing a management model to promote business development in rural areas.

The intervention stage (training and accompaniment) was established with the formation of four work teams: the operational committee, in charge of the leadership of each of the five business lines; the operation of the business lines, responsible for the operation and efficiency of each of them; the steering committee, made up of the Board of Directors of the cooperative, in charge of the efficiency and operation of the cooperative and all the members of the cooperative. The authors worked with these four teams at various times, and in some cases, jointly, particularly in specific training courses.

The training and support were conducted to develop, as indicated by Garzón (2015), absorption capability, innovation capability, learning capability, and adaptability, focusing on two axes in the management model. The first involved organisational strengthening, implemented with the steering committee and the entire cooperative, addressing leadership, integration, organisational climate, strategic planning, decision-making, transparency, and accountability. The second focused on business efficiency, executed with teams from the different business lines, the operating committee, and, to some extent, the cooperative itself, targeting production improvement,

productive reconversion, cost calculation and pricing, work organisation, market adaptation, as well as customer search. Special attention was given to sustainability, which was incorporated into all stages and axes of the model, particularly in relation to the Official Mexican Standards (NOMS) and the green philosophy as organisational values within strategic planning.

During the intervention stage, observation logs, monthly reports, and income statements were prepared and presented at the cooperative's assemblies. With these documents, it has been possible to collect some impact measurements presented in the results section.

Results

The implementation of the coursework workshop enabled the identification of key weaknesses in the cooperative, including a lack of resources, underutilised infrastructure, limited market knowledge, and low motivation. As a result, strategic objectives were established, focused on generating income through new business ventures, creating efficient work teams under NOMS, designing an appropriate offer for the local and regional markets, as well as strengthening members' organisational and cooperative capabilities.

To achieve this, a model of comprehensive training (covering cooperative law, strategic planning, costs, organisational climate, sustainability, and other areas) and practical support from committees and business lines (such as start-up, quality, financial control, accountability, and continuous improvement) was implemented, fostering dynamic capabilities for absorption, learning, innovation, and adaptation.

It is essential to note that establishing the core services required significant effort as the cooperative's operational expenses led to a deficit in its first year. Initially, there were only two lines of business: commercial fishing, more formally established but with many areas for improvement, and the restaurant, which incurred losses and maintained an extremely low entrepreneurial spirit among the members, with no organisational efficiency. Training began with micro manuals, comics, case studies, integration exercises, and others; this achieved visible impacts in the medium term: developing learning and absorption capability, mastering the management model for the cooperative, acquiring business values, fostering integration, raising the awareness of cooperative work, the formal organisational structuring of committees, defining roles, and strategic planning.

Regarding the quantitative measurement of the impact of the intervention, it was possible to design the operability of the five business lines (restaurant, commercial fishing, miscellaneous, sport fishing and ecotourism), train the five internal operation teams of the same, in addition to offering new products and services according to the market in miscellaneous, sport fishing and ecotourism with which it had not worked. Hence, there were no work teams or product and service offers. During the accompaniment, intervention techniques were implemented, such as role-play situations where optimal and erroneous cases were presented for the team members to evaluate; mirror training was also carried out (learning by copying and doing),

the implementation of logs of responsibilities and evaluation, financial and accountability formats, resulting in an outstanding improvement of financial indicators. The quantitative impact on the financial profits was notorious since not only did they not have income at the beginning of the intervention, but they were in deficit in the two lines of business they worked; with these profits they invested in a refrigerated van to distribute the product and thus eliminate the intermediary (who kept most of the profit). They expanded the restaurant area by 50 percent, thus they hired more personnel, reaching twenty jobs distributed across the five lines of business, which were covered by competitive salaries relative to the region and the benefits provided by law.

Conclusion

The hypothesis raised during the implementation of this model can be accepted, especially from the intervention stage for business development. Dynamic capabilities can be generated that promote the efficiency of the organisation and contribute, in the medium and long term, to improving the conditions of the cooperative and the well-being of its members, potentially generating benefits for their environment as well. The obtained results show that the implementation of the management model aimed at business strengthening not only generated operational improvements but also produced dynamic capabilities (absorption, learning, innovation, and adaptation) that structurally transformed the competitiveness of the cooperative "Las Puertas de Calderón" S.C. de R.L. This model managed to influence the strategic reconfiguration of the business, expressed in the elimination of intermediaries, the incorporation of their own coordination infrastructure, the expansion of services, and the professionalisation of financial and operational management.

Domínguez-Aguirre et al. (2025) indicate that many rural cooperatives survive but are not competitive; to consolidate them, it is crucial to strengthen their internal structure and the commitment of their partners. Peteán & Cappato (2011) show that, on the Paraná coast, the formation of cooperatives among vulnerable populations – supported by laws, training, and networks – has reinforced biocultural conservation, a solidarity economy, and community participation. Meanwhile, Aranda et al. (2023) explain that significant weaknesses are evident in the fishing sector in terms of internal organisation and cooperative spirit. Comparing the cases cited by these authors with this case study, it is observed that at the beginning of the intervention and implementation of the model, the cooperative "Las Puertas de Calderón" was not competitive; it merely survived. It had critical areas for improvement, especially those related to internal structure, cooperative philosophy, teamwork, and decision-making, among others, therefore it can be concluded that the problems of cooperatives are similar both in Mexico and worldwide.

The replicability of the model to other cooperatives can be carried out since we were working with this model in six more cooperatives, all with results at different levels. The important thing that partly delimits the results is the profile of the cooperative, but this can be known and defined in the implementation of the tools of the first stage, which is the diagnosis. On the other hand, the results of this cooperative

have been continuously reviewed, and it can be said that they are continuing along a positive path regarding appropriation of the model in addition to organisational and cooperative efficiency. To guarantee continuity in the market and guarantee the future success and sustainability of the cooperative, it is necessary to work with the cooperative in generating learning to make financial investment decisions not only in the core services, but in financial institutions that can provide an opportunity for greater growth in addition to benefits for their members and their families. With the financial system and institutional networks, it is possible to expand the social and economic benefits. This would be a step towards the region's long-term competitiveness.

The results presented here are important information for decision-makers and government institutions since the implementation of collaborative work actions, such as the use of five-helix strategies (Carayannis et al., 2022), can be recommended, as is the case in this paper. Hence it is advisable to organise projects with communication and transversal responsibilities between the different institutions giving leadership to cooperatives and a decision-making capacity. It is also crucial to approach universities that have experts in the different areas of the project to be implemented, as this will allow effective and timely accompaniment to the projects and the groups with which they will work, guaranteeing a greater scope in the results of the project. Therefore, the university must assume an active role not only as a generator of knowledge but also as an agent of intervention and co-executor of local development by fostering collaboration within institutional networks and promoting the use of programs to advance local and regional development. Consequently, this study provides empirical evidence that cooperatives, under adequate conditions of strategic accompaniment, can evolve from subsistence structures into competitive organisations with verifiable economic and social impact, thereby contributing to the improvement of well-being in rural territories.

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GENEROWANIE DYNAMICZNYCH ZDOLNOŚCI ORGANIZACYJNYCH DLA ROZWOJU DZIAŁALNOŚCI GOSPODARCZEJ SPÓŁDZIELNI W JALISCO

Streszczenie: Celem artykułu jest przedstawienie strategii mającej na celu generowanie dynamicznych zdolności, promowanie rozwoju biznesu w grupie spółdzielni zajmujących się usługami turystycznymi i rybackimi w stanie Jalisco. Należy zauważyć, że profile akademickie badanych członków tych spółdzielni były ograniczone, co znalazło odzwierciedlenie w braku umiejętności zarządzania organizacyjnego, braku pracy zespołowej oraz zauważalnym braku empatii i solidarności. W odpowiedzi na te potrzeby strategia skupiła się na szkoleniu i towarzyszeniu spółdzielniom w tych obszarach, ze szczególnym naciskiem na rozwijanie umiejętności organizacyjnych z wykorzystaniem dostępnych narzędzi, które wzmocniłyby ich dynamiczne zdolności. Proces towarzyszenia trwał średnio sześć lat i stawiał czoła specyficznym wyzwaniom wynikającym ze specyfiki każdej spółdzielni. Wyniki wykazały znaczny postęp w zarządzaniu organizacją i rozwoju linii biznesowych, przyczyniając się do sukcesu biznesowego tych spółdzielni.

Słowa kluczowe: dynamiczne zdolności organizacyjne, rozwój biznesu, spółdzielnie

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INVESTMENT POTENTIAL OF MEDTECH STARTUPS: HOW REGULATORY BARRIERS, REIMBURSEMENT, AND SCALABILITY SHAPE INVESTOR DECISIONS

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Abstract: The investment potential of medtech (medical technology) startups is shaped by a complex interplay of regulatory, financial, and technological factors. Although prior studies have explored startup valuation and innovation dynamics, limited attention has been paid to how certification, reimbursement, and scalability jointly influence investor decisions in emerging markets. This study addresses this gap by analyzing Polish medtech startups using sector analysis and survey data from 33 investors. The findings reveal that public reimbursement significantly enhances the investment attractiveness of medtech startups' offerings, while regulatory certification (CE/FDA) acts as both a barrier to entry and a source of competitive advantage. Scalability and global expansion potential emerge as decisive factors, alongside positioning in high-innovation segments such as AI, ML, and telemedicine. By integrating these determinants into a comprehensive framework, the study advances the scholarly understanding of investment decision-making in medtech. It provides actionable insights for investors, inventors, entrepreneurs, and policy makers looking to foster innovation-driven healthcare ecosystems.

Keywords: investment attractiveness, medtech startups, public reimbursement, regulatory barriers, scalability

JEL Classification: M13, O32, L26, I15, G24

Introduction

Globally, the medtech market is valued at approximately € 606 billion, with the United States and Europe accounting for 46.6% and 26.4% of this share, respectively

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(MedTech Europe, 2023). Poland's medtech sector is in its infancy but is expanding, driven by rising health expenditures. Between 2014 and 2023, Poland's health spending nearly doubled to 7.1% of GDP (GUS, 2023), fostering medtech growth.

Certification processes such as CE marking in the EU and FDA approval in the U.S. are essential for market entry but impose significant costs and time-to-market delays. These requirements act as barriers for early-stage firms while simultaneously serving as quality signals that strengthen competitive positioning once achieved (FDA, 2018; FDA, 2020). Similarly, public reimbursement, understood as eligibility for coverage by the national health system, directly influences revenue predictability and market access.

Finally, AI, ML, and telemedicine solutions attract more investor interest than traditional devices (Koalicja AI w Zdrowiu, 2024; Mejtoft et al., 2022).

Existing research provides partial insight into these dynamics. Studies on entrepreneurship and early-stage finance emphasize life-cycle stage and risk-return profiles (Wilson & Silva, 2013; Jędrzejczyk, 2023), while innovation management literature highlights clinical evidence, regulatory compliance, and business model design (Mejtoft et al., 2022). However, an integrated perspective that combines regulatory barriers, reimbursement, scalability, and technological segmentation in the context of investor decision-making remains underdeveloped, particularly in emerging EU markets.

This study addresses this gap by analyzing the investment potential of Polish medtech startups through a mixed-method approach centered on survey data from 33 investors. The research adopts an exploratory approach aimed at identifying key determinants of investor preferences rather than testing strict causal relationships. Consequently, five guiding research questions were formulated: RQ1: How does public reimbursement influence the perceived attractiveness of investment in medtech startups? RQ2: In what ways does the life cycle stage affect investor evaluation? RQ3: How do regulatory and certification requirements shape investor perceptions of risk and competitive advantage? RQ4: How do scalability and globalization potential influence investor interest? RQ5: Which technology domains attract the greatest investor attention and why? By addressing these research questions, the paper contributes to theory, advances understanding, and offers actionable guidance to investors, entrepreneurs, and policymakers.

Theoretical overview

Investment attractiveness of startups: conceptual foundations

In entrepreneurship research, investment attractiveness reflects growth, risk, and execution; key determinants include team, novelty, scalable model, competitive edge, and market fit (Jędrzejczyk, 2023; Lobakhina et al., 2019). At the same time, information asymmetry and uncertainty decrease as ventures progress through their life cycle, making the stage of development a critical screening criterion for investors (Wilson & Silva, 2013; Łuczak, 2018).

Research on commercialization and pricing strategies emphasizes that technological superiority alone rarely guarantees revenue generation without complementary capabilities such as disciplined pricing, effective go-to-market channels, and robust sales operations (Simon & Fassnacht, 2019). Consequently, scalable, software-based models offer predictable improvements in unit economics and attract investors (Wilson & Silva, 2013; Simon & Fassnacht, 2019).

Regulatory barriers and market authorization in medtech

Market access in medtech is conditioned by conformity assessment and authorization procedures, most notably CE marking in the EU and FDA approval in the United States, which require evidence of safety and clinical effectiveness (FDA, 2018; FDA, 2020; FDA, 2023). For early-stage companies, these processes involve significant capital costs, extended time-to-market, and complex quality system requirements (Maresova & Kuca, 2014). At the same time, certification serves as a credible quality signal that facilitates adoption by providers and payers and raises entry barriers for imitators, consistent with Porter's framework on industry structure and mobility barriers (Porter, 2006; Maresova & Kuca, 2014).

In the domain of digital health and software as a medical device, its classification and adequate documentation remain critical, reinforcing the dual role of regulation (FDA, 2020; Maresova & Kuca, 2014).

Public reimbursement and Health Technology Assessment (HTA)

In public health systems, reimbursement drives demand and stability by moving solutions from out-of-pocket niches to mainstream adoption (AOTMiT, 2023). Consequently, solutions with reimbursement potential offer investors greater revenue visibility and a shorter path to scale, aligning directly with the objective of assessing investment attractiveness in medtech startups.

Scalability and globalization potential of medtech startups

Scalability, which means growing revenue faster than costs, underpins technology investments. Studies on early-stage digital companies indicate that projects combining knowledge intensity, modularity, and data-driven feedback loops transition more rapidly from validation to replicable commercialization (Griva et al., 2023). In medtech, scalability is accelerated by modular architectures, software components, standardized implementation pathways, and channel partnerships; however, regulatory readiness and robust evidence packages remain prerequisites (Mejtoft et al., 2022).

Expansion into well-funded markets expands TAM and accelerates organizational learning across payer regimes (Wilson & Silva, 2013; Simon & Fassnacht, 2019). Strategic commercialization research consistently shows that the ability to sequence regulatory approvals (e.g., CE, FDA), access distribution networks, and maintain pricing discipline supports scaling and sustainable competitive advantage (Mejtoft et al., 2022; Simon & Fassnacht, 2019).

Technological segmentation and innovation intensity

The medtech spans devices, in vitro diagnostics, and digital health. Recent waves focus on AI/ML, telemedicine, and data-intensive applications (FDA, 2020; Mejtoft et al., 2022; FDA, 2023). At the clinical-industry interface, physician-industry collaboration, when ethically managed, accelerates the co-creation of solutions with measurable health outcomes (Chatterji et al., 2008). Analyses of European market structure suggest that regulatory classifications and evidence requirements shape entry dynamics and competitive intensity (Maresova & Kuca, 2014).

From an investment perspective, high-innovation segments such as AI/ML and telemedicine combine superior clinical or operational impact with software-like economics, enabling rapid scaling and defensible pricing positions (Mejtoft et al., 2022; Simon & Fassnacht, 2019).

Startup life cycle and investor preferences

The startup life cycle organizes investor preferences by risk profile, capital requirements, and information availability. Pre-seed/seed stage prove concepts, early growth/growth validate scaling, later stages prepare investors exits (Wilson & Silva, 2013; Cegielska & Zawadzka, 2017; Sipari, 2017; Merelä, 2021). Financing instruments evolve accordingly, from FFF, angels, and accelerators to VC rounds and, eventually, PE or debt (Merelä, 2021; Lemley & McCreary, 2021).

Valuation at early stages employs hybrid qualitative–quantitative methods (Berkus, Scorecard, DCF variants including VCM and FCM) that incorporate scenario analysis sensitive to regulatory and reimbursement milestones (Gemzik-Salwach, 2014; Babiarz, 2016; Wieczorek & Woźniak, 2019; Montani, 2020; Mańkowska, 2022). For investors, the stage of development thus serves as a synthetic indicator of execution risk and proximity to regulatory and payer pathways, explaining the preference for ventures in the commercialization or expansion phases (Wilson & Silva, 2013; Łuczak, 2018).

Synthesis, research gaps, and rationale for research questions

Reimbursement shapes funded demand and revenue visibility, providing investors with a critical signal of risk reduction and scalability potential (AOTMiT, 2023). Scalability and globalization link technical merit to investable growth through replicable deployments, software leverage, and cross-market expansion (Simon & Fassnacht, 2019; Griva et al., 2023; Mejtoft et al., 2022). Technological segmentation matters because high-innovation domains (AI/ML, telemedicine) combine clinical impact with favorable scale economics (Chatterji et al., 2008; Mejtoft et al., 2022). Finally, the life-cycle stage integrates risk, capital needs, and proximity to regulatory and payer milestones (Wilson & Silva, 2013; Łuczak, 2018).

Despite these insights, the literature reveals research gaps relevant to this study. First, most prior works examine regulatory, reimbursement, scalability, and technological segmentation factors in isolation, whereas investor decisions in payer-driven systems result from their combined configuration. Second, in the context of Poland

and the CEE region, there is a lack of integrated analyses linking entrepreneurial dynamics with HTA and regulatory frameworks. Third, few studies operationalize investor preferences into structured rankings of startups based on these combined determinants. Therefore, the main objective of this study is to evaluate the investment attractiveness of investment in Polish medtech startups included in the 2024 Top Disruptors in Healthcare report and to identify the determinants that shape investor decision-making in this sector (Koalicja AI w Zdrowiu, 2024). The research aims to explore whether and how factors such as reimbursement, regulatory certification, scalability, technological segmentation, and life-cycle stage shape investor evaluations, using descriptive evidence.

Research design

The study employed a survey-based quantitative analysis. The core empirical component consisted of a CAWI (Computer-Assisted Web Interviewing) survey targeting investors and investment analysts active in the medtech sector. The CAWI method ensured structured responses from dispersed participants. The process covered objective setting, questionnaire design, CAWI data collection (Microsoft Forms), and data analysis (Microsoft Excel). The survey was conducted in January 2024 and formed the primary source of empirical evidence for answering research questions.

Sampling strategy

Convenience sampling targeted active medtech investors. This approach was justified by the specialized nature of the target population and the need to ensure that the respondents had relevant expertise.

The final sample comprised 33 respondents, including individual investors, venture capital professionals, business development managers, and analysts. All participants confirmed their active involvement in medtech-related investment activities, ensuring the relevance and credibility of the data collected. Although the sampling strategy relied on convenience methods, the pool represents a diverse set of actors actively engaged in medtech investment in Poland. Recruitment used networks, referrals, and sector-specific social media. All respondents confirmed active involvement in medtech-related investment activities, ensuring the relevance of their perspectives despite the absence of statistical representativeness. Non-probabilistic sampling limits generalizability. Nevertheless, the composition of the sample reflects heterogeneity in roles and investment strategies: 41% of the respondents were investment analysts or professionals from investment institutions, 22% were individual investors, 13% were business development managers, and 9% were startup founders, with the remaining respondents (15%) being board members, M&A specialists, and business angels. Investment focus varied, with 30% concentrating exclusively on medtech, 42% treating it as one of their main areas, and 27% considering it a minor component of their portfolio. The objectives of investing activity ranged from return maximization (42%) and portfolio diversification (30%) to strategic technology acquisition (18%) and ESG-aligned innovation (9%). This diversity

provides a credible basis for an exploratory analysis of investor preferences in the medtech domain. We included fully completed and consistent responses from active medtech investors.

Operationalization of variables

Each research question was operationalized through specific survey items:

For RQ1 (Reimbursement): Measured by Likert scale ratings (1-5, where 1 indicates the least importance and 5 the greatest importance) of public reimbursement and binary responses regarding willingness to invest in startups without reimbursement potential.

For RQ2 (Life-cycle stage): Captured through ranking of preferred development stages (Pre-seed, Seed, Early Growth, Growth, Late Stage) and Likert scale importance ratings.

For RQ3 (Regulatory barriers): Assessed using Likert scale importance ratings of certification importance (CE/FDA) and perceived capital barriers associated with regulatory compliance.

For RQ4 (Scalability and globalization): Evaluated through Likert scale importance ratings of scalability and selection of preferred expansion regions (EU, US, other markets).

For RQ5 (Technological segmentation): Measured through Likert scale importance ratings, selection of the most attractive technology domains (AI, telemedicine, biotechnology, etc.), and agreement with statements on innovation-driven investor interest.

Ethical and methodological considerations

The study adhered to the principles of research integrity and respondent confidentiality. Participation was voluntary and the respondents were informed about the academic purpose of the research and the anonymity of their responses. No personally identifiable information was collected.

Methodologically, the use of a convenience sample introduces limitations regarding generalizability; however, this approach was deemed appropriate given the niche nature of the medtech investment community and the exploratory character of the study.

Research results

We analyzed CAWI data from 33 Poland-based medtech investors. All participants confirmed their involvement in investment activities within the sector, ensuring the relevance of their perspectives.

Public reimbursement and investment attractiveness (RQ1)

We tested whether public reimbursement increases investment attractiveness. The findings strongly support this assumption. Reimbursement was identified as a key factor by 32 out of 33 respondents, and its importance was rated at an average

of 4.09 on a five-point Likert scale, with the most frequent responses being 5 (very important) and 4. Furthermore, two-thirds of the respondents (67%) declared that they would not invest in a startup that does not include the public payer in its business model, while only one-third expressed conditional openness to such investments. Although reimbursement was most frequently ranked third among the most important determinants (42.4%), its near-universal recognition and high mean score confirm its strategic role in reducing revenue risk and enabling scalability.

Life-cycle stage as an investment criterion (RQ2)

The second RQ referred to the assumption that the life-cycle stage of a startup plays a critical role in the investor assessment. The data confirm this relationship. Thirty-one respondents indicated the stage of development as an important factor, and in ranking tasks, it most often appeared in second position (30.3%), followed by fourth (21.2%). Investors preferred the growth (39%) and early growth (33%) stages, which together accounted for nearly three-quarters of responses. The seed stage attracted 18% of preferences, while the pre-seed and late stage options were marginal (6% each). Thus, investors prefer post-validation ventures and avoid the riskiest early and lowest-return late stages.

Regulatory barriers and certification (RQ3)

The third RQ was proposed to examine whether regulatory and certification barriers restrict early growth but enhance competitive positioning once achieved. The results corroborate this dual effect. The importance of CE and FDA certification was rated on an average of 4.36, with 20 respondents assigning the maximum score of 5 and eight assigning 4. At the same time, the perceived capital intensity of regulatory compliance, including certification, clinical trials, and intellectual property protection, was rated at 4.03, indicating that these requirements are widely regarded as significant financial barriers. Respondents also acknowledged the strategic value of regulation in limiting market access for substitutes, with a mean score of 4.12 on this dimension.

Scalability and globalization potential (RQ4)

The fourth RQ aimed to explore whether scalability and globalization potential are the primary drivers of investor interest. The survey results provide compelling support for this claim. Scalability achieved the highest importance rating among all determinants, with a mean of 4.61 and the modal response at the maximum value of 5. Additionally, when asked about preferred regions for international expansion, respondents overwhelmingly indicated the United States and the European Union as priority markets, while other regions such as the United Kingdom, the Middle East, and East Asia were mentioned less frequently, and China, Africa, and Canada were not considered strategic destinations. These preferences underscore the centrality of scale economics and access to large, well-funded healthcare systems in shaping investment decisions.

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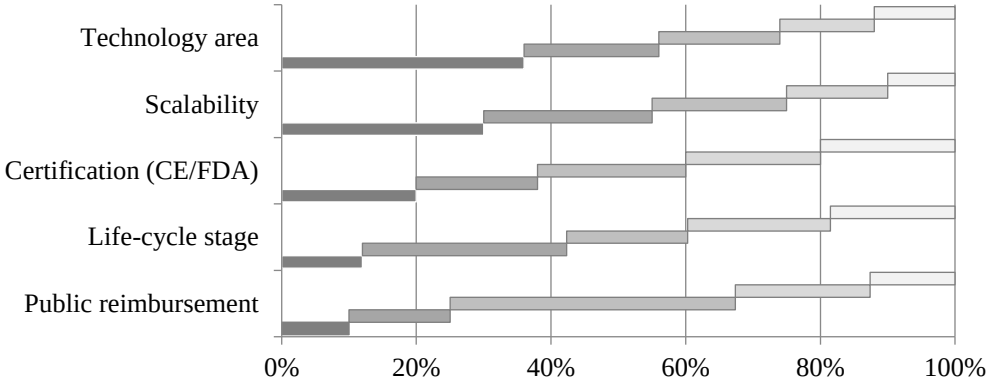
Technological segmentation and innovation intensity (RQ5)

The fifth RQ investigated whether startups operating in high-innovation segments such as artificial intelligence and telemedicine attract greater investor attention than those in traditional domains. The evidence confirms this expectation. When asked to identify the most attractive technology domains, the respondents most frequently selected AI/machine learning (28 indications) and telemedicine (21), followed by biotechnology (12). Furthermore, agreement with the statement that high-innovation scalable segments generate greater investor interest averaged 4.48 on a five-point scale, with the majority of responses clustered at 4 and 5. The technological area was also the most frequently top-ranked determinant in the overall hierarchy of factors, occupying first place in 36% of cases. The figure below sums up the distribution of ranks attributed by the respondents to the determinants investigated within the RQs.



	Public reimbursement	Life-cycle stage	Certification (CE/FDA)	Scalability	Technology area
Rank 1 [%]	10	12	20	30	36
Rank 2 [%]	15	30,3	18	25	20
Rank 3 [%]	42,4	18	22	20	18
Rank 4 [%]	20	21,2	20	15	14
Rank 5 [%]	12,6	18,5	20	10	12

Figure 1. Rank distribution (1-5, with 1 for the least importance and 5 for the greatest importance) for key determinants of investment in medtech

Source: Own elaboration

Discussion

Public reimbursement emerges as a critical determinant of investment attractiveness, reflecting the payer-driven logic of healthcare markets. The life-cycle stage strongly influenced investor preferences, with a clear bias toward ventures that have

validated their business model and are positioned for scaling. Regulatory requirements were perceived as both a barrier and a source of competitive advantage, confirming their ambivalent role in shaping growth trajectories. Scalability and globalization potential dominate the hierarchy of determinants, while technological segmentation reinforces the premium placed on innovation and digital transformation.

The CAWI results reveal consistent patterns across the research questions. Reimbursement is widely seen as the key to investment attractiveness and is highly on importance, with two-thirds unwilling to invest where the public payer is absent from the business model. This reinforces the view that, in payer-centric systems, reimbursement transforms willingness to pay into funded demand and stabilizes cash flows, thus lowering revenue risk and shortening the path to scale (AOTMiT, 2023). Second, the life cycle stage is a decisive filter: preferences concentrate in post-validation phases (early growth and growth), consistent with declining information asymmetry and clearer unit economics as ventures mature (Wilson & Silva, 2013; Łuczak, 2018). Third, regulatory requirements are perceived ambivalently yet constructively: respondents rated the costs and capital intensity of certification as high while simultaneously attaching high value to CE/FDA authorization, which credibly signals quality and constrains non-certified substitutes (FDA, 2018; Maresova & Kuca, 2014). Fourth, scalability and globalization are top investor priorities associated with US and EU markets, settings where payer pathways, budget depth, and price points can support rapid diffusion. Finally, technological segmentation proved to matter with investors' attention centered on AI/ML and telemedicine, reflecting the combination of innovation intensity, software-type economics, and measurable clinical or operational results (Mejtoft et al., 2022; Koalicja AI w Zdrowiu, 2024).

In sum, these results validate that investor decision-making in medtech is shaped by the joint configuration of regulatory preconditions, payer status, scalability, stage, and technology domain, rather than by any single factor in isolation. The pattern is internally consistent; investors prefer opportunities where regulatory risk is either passed or credibly managed, where reimbursement amplifies addressable demand, where the business model enables replication across geographies, and where the technology sits in innovation-dense domains.

Positioning within and extending the literature

The findings align with HTA-driven market-access research, where clinical effectiveness, safety, cost-effectiveness, and budget impact gate diffusion (AOTMiT, 2023).

The research results add two clarifications. First, investors simultaneously price in the capital drag associated with certification (mean perceptions of barrier height are high) and the moat-building effect once authorization is secured (high importance assigned to CE/FDA). Second, respondents perceive regulation to effectively limit substitutes, reinforcing the idea that compliance not only grants access, but also shapes the competitive set (FDA, 2018; European Commission, 2025).

Regarding the life-cycle stage, the concentration of preferences in early growth and growth phases fits the entrepreneurship and early-stage finance insights that risk and information quality evolve along the financing continuum (Wilson & Silva, 2013; Łuczak, 2018). The CAWI evidence adds a medtech specific layer: stage preferences appear intertwined with regulatory and payer milestones, suggesting that investors implicitly proxy readiness for certification and reimbursement through stage, consistent with applied commercialization work in medtech (Mejtoft et al., 2022).

The importance of scalability and globalization resonates with the research on strategy and commercialization that emphasizes replicable deployment, route-to-market design, and disciplined monetization (Simon & Fassnacht, 2019). The CAWI data refine this view by revealing a geographic hierarchy; the US and EU are favoured destinations, underscoring the interplay between scale economics and institutional environments with mature reimbursement and purchasing infrastructures. Finally, the focus on AI/ML and telemedicine echoes reports and scholarly discussions on innovation hotspots in European medtech, where patent intensity and data-rich applications drive momentum (MedTech Europe, 2023; Mejtoft et al., 2022; Koalicja AI w Zdrowiu, 2024). The survey expands this narrative by showing that investors do not treat 'innovation' as generic; they allocate attention to domains that combine measurable outcomes and software leverage, indicative of faster learning cycles and better operational leverage.

Conclusion

This study examined determinants of the attractiveness of medtech startups in Poland. The CAWI survey of 33 investment professionals confirmed that all five factors significantly influence investor decision-making. Reimbursement emerged as a critical determinant, reflecting the payer-driven logic of healthcare markets. The life-cycle stage strongly shaped preferences, with investors favoring ventures in early growth and growth phases. Regulatory requirements were perceived as both a constraint and a source of competitive advantage, while scalability and globalization potential dominated the hierarchy of determinants.

Findings add institutional factors (HTA, regulation) to startup attractiveness models. They demonstrate that investor assessments in medtech cannot be explained solely by generic risk-return considerations; they are conditioned by the interplay of regulatory readiness, payer status, and scalability. This layered perspective complements stage-based theories by showing that stage effects are mediated by progress toward certification and reimbursement milestones. Furthermore, the results bridge innovation management and market-access research, underscoring that value realization in medtech depends as much on evidence generation and coding readiness as on technological novelty.

For investors, the results suggest practical screening heuristics: prioritize ventures that are approaching or have achieved regulatory and reimbursement milestones, demonstrate credible scalability into US and EU markets, and operate in innovation-intensive domains where outcome evidence can be generated and monetized. For entrepreneurs and inventors, the findings highlight the need to sequence clinical

validation, regulatory filings, and payer strategy to compress time to revenue and de-risk fundraising. Building early relationships with HTA and notified bodies, as well as planning for international expansion, can significantly enhance the attractiveness to investors. For policymakers, the strong investor sensitivity to reimbursement and certification underscores the importance of transparent HTA criteria, adequate institutional capacity, and efficient regulatory pathways, which collectively shape the competitiveness of the domestic medtech ecosystem.

In Poland's emerging market, reimbursement readiness and regulatory credibility help offset ecosystem gaps, and the US/EU expansion also validates pricing and evidence. Two limitations of the study should be acknowledged. First, the sample was convenience-based and relatively small (N = 33), which constrains the generalizability of the findings beyond the expert population surveyed. Second, the study relied on self-reported preferences, which may diverge from actual investment behavior under deal-specific conditions. These limitations do not undermine the internal validity of the findings, but call for caution in extrapolation. Convenience sampling and descriptive statistics confirm the exploratory nature. Future research could address these limitations by combining survey-based evidence with transaction-level data on funding rounds, valuations, and post-authorization adoption trajectories. Comparative studies across EU markets with different HTA regimes and regulatory capacities would enrich our understanding of institutional effects on investor behavior. At the construct level, modeling interactions among regulation, reimbursement, and stage, such as whether reimbursement potential moderates the effect of stage on attractiveness, would provide deeper theoretical insight. Finally, examining how evidence-generation strategies (e.g., clinical endpoints, real-world data) mediate the link between the technology domain and investor interest would advance both academic and practical knowledge.

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POTENCJAŁ INWESTYCYJNY START-UPÓW MEDTECH: JAK BARIERY REGULACYJNE, REFUNDACJA I SKALOWALNOŚĆ KSZTAŁTUJĄ DECYZJE INWESTORÓW?

Streszczenie: Potencjał inwestycyjny start-upów z sektora technologii medycznych (medtech) kształtowany jest przez złożoną interakcję czynników regulacyjnych, finansowych i technologicznych. W dotychczasowych badaniach analizowano wycenę start-upów i dynamikę innowacji, jednak niewiele uwagi poświęcono temu, w jaki sposób certyfikacja, refundacja i skalowalność łącznie wpływają na decyzje inwestorów na rynkach wschodzących. Niniejsze badanie wypełnia tę lukę, sondując polskie start-upy z branży technologii medycznych, wykorzystując analizę sektorową i dane z ankiet przeprowadzonych wśród 33 inwestorów. Wyniki wskazują, że refundacja publiczna planowanego do wprowadzenia na rynek wyrobu znacząco zwiększa atrakcyjność inwestycyjną, podczas gdy certyfikacja regulacyjna (CE/FDA) pełni podwójną rolę, stanowi barierę wejścia, ale także źródło przewagi konkurencyjnej. Skalowalność i potencjał globalnej ekspansji wyłaniają się jako czynniki decydujące, obok pozycjonowania wyrobu w segmentach wysokiej innowacyjności, takich jak sztuczna inteligencja, uczenie maszynowe, telemedycyna. Integrując te determinanty w spójne ramy, badanie wnosi wkład do rozwoju wiedzy na temat procesu podejmowania decyzji inwestycyjnych w sektorze medtech oraz dostarcza praktycznych wskazówek dla inwestorów, wynalazców, przedsiębiorców i decydentów, którzy dążą do wspierania ekosystemów opieki zdrowotnej opartych na innowacjach.

Słowa kluczowe: atrakcyjność inwestycyjna, start-upy medtech, refundacja publiczna, bariery regulacyjne, skalowalność

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ORGANIZATIONAL CULTURE AS A SOURCE OF COMPETITIVE ADVANTAGE: A COMPARATIVE ANALYSIS OF MEXICAN AIRLINES

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Abstract: Organizations constantly innovate to adapt to the ever-changing market and, above all, to face competition, thus organizational culture is an intangible asset necessary for their adaptability to the same. The aim of this work is to analyze the organizational culture of the following companies: Concesionaria Vuela Compañía de Aviación, S.A.P.I. de C.V. (Volaris), Aeroenlaces Nacionales, S.A. de C.V. (Viva Aerobus) and Aerovías de México S.A. de C.V. (Aeroméxico) in order to identify the elements that currently act as a differential competitive factor. A methodology with a quantitative approach was used, with a longitudinal non-experimental design, which measured the market share of the competing companies, comparing the efforts to develop an appropriate organizational culture for each one, in addition to confirming the hypothesis raised, in which the organizational culture works as a competitive element for companies in the sector. In conclusion, culture does represent a differentiating factor in a company, since in addition to being related to the company's values, it allows employees to project them, which results in a better customer experience.

Keywords: airline industry, competitive advantage, organizational culture

JEL Classification: M14, M10, L93

Introduction

Companies are constantly innovating to attract and retain customers, compete, and maintain a prominent position in the market. However, in some cases, the absence of the right strategic approach allows competitors to achieve greater growth.

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Organizational culture has therefore become a critical factor. According to Cújar et al. (2013), it plays a key role in shaping the organizational environment and determining how companies are perceived by customers. For this reason, culture must be strategically designed as a frame of reference that connects with clients, fostering comfort and identification with the company's values (Yopan et al., 2020). Furthermore, organizational culture is closely related to the value chain, enabling companies to stand out from competitors. As Méndez (2019) notes, culture can be compared to human DNA – unique, with the capacity to leave a lasting impression on consumers.

While organizational culture has been widely studied in developed markets, little is known about its role in Latin American airlines. This study is original in linking cultural practices in Mexican carriers – Volaris, Viva Aerobus, and Aeroméxico – with quantitative indicators such as sales and market share, while also addressing unique elements like gender equality and inclusive policies. In doing so, it contributes new evidence to how organizational culture functions as a competitive advantage in emerging markets.

Literature review

Organizational culture and its role in a modern company

For authors such as Shein (1998), Anzola and Hinestrosa (2003), Garibaldi, Wetzel and Ferreira (2009), Cheung, Wong and Lam (2012) and Hernández, Méndez and Contreras (2014), organizational culture is a set of shared beliefs, values, meanings, and basic assumptions that shape the behavior, structure, and identity of an organization. It is expressed through social practices, symbols, and behaviors, creating a shared cognitive and emotional framework that not only guides how things are done but also serves as a strategic resource for the organization's continuity and sustainability.

Organizational culture encompasses diverse characteristics and is not defined uniformly, leading to various cultural types within organizations. According to IPADE Business School (2025), Pursell (2023), and Roger Harrison's classification, the four main types are: power-oriented (focused on competitiveness and strong leadership), rule-oriented (emphasizing stability and strict compliance), results-oriented (centered on efficiency and goal achievement), and people-oriented (prioritizing employee development, motivation, and social values).

Organizational culture is a shared system of meaning that distinguishes one organization from another, often referred to as its "psychology" or "human core" (León, 2019; Hernández, 2023). It comprises symbols, language, ideology, beliefs, rituals, and myths, shaping norms and identity to achieve business objectives (Guerrero & Silva, 2017). Méndez (2019) emphasizes its evolving, intangible nature, highlighting the need to adjust and strengthen it to align with corporate goals. As Bernal et al. (2015) note, cultivating a strong culture fosters collaboration and quality service, ultimately benefiting the organization.

Organizational culture, in its role as a differentiating factor, drives innovation in all types of processes. It is one of the main elements that can stimulate or inhibit innovation. Everything depends on its development. Furthermore, the type of culture

that prevails in the company is also considered important for innovation (Naranjo-Valencia et al., 2012). Innovation in organizations is important for growth. It is essential to foster it in the development of the organization's culture as it helps achieve the stated objectives and even surpass them if investment and training are made based on the company's philosophy and values.

Organizational values shape not only the company's ethical image but also its internal work environment and behaviors. Rodríguez & Romo (2013) emphasize that such values are often internally oriented, prioritizing employee well-being so that they become personal values, leading to more authentic external interactions. Fostering genuine, consistently applied values is essential as customers can sense the difference between professional obligation and true passion – ultimately impacting service quality.

According to Pursell (2023), strengthening organizational culture enhances a company's strategic capacity by guiding actions through shared values, improving overall efficiency. As a foundational element in internal operations, culture can positively influence key areas such as sales, ultimately benefiting the organization.

A strong organizational culture is reflected in a company's ability to project its achievements through a clear identity. Pursell (2023) and Mena (2019) identify key elements that support such a culture: a guiding philosophy, a clear mission and vision, shared values, a positive organizational climate, a strong sense of corporate identity, and well-defined norms that promote order and accountability.

According to Bernal et al. (2015), marketing should be conceived as a philosophy that guides both the organizational structure and goals, with the purpose of effectively serving a previously studied market, and citing Porter (2007), they state that the cultural context – made up of institutions and social groups – has a direct impact on the values and behaviors of consumers, which facilitates the detection of opportunities and threats within the target market.

Organizational culture exerts a significant influence on all areas of the company, encompassing all hierarchical levels. For Hugo, Nóbile, and Soledad (2014), factors such as stress and anxiety in the workplace are closely linked to organizational culture since they directly impact the way work is carried out. Salas (2018) concluded that a strong organizational culture has a positive impact on the well-being of an organization's members, particularly in the sales department. Elements such as fulfilling responsibilities, professionalism, and proper process execution contribute to employees feeling attuned to their work, which is reflected in the obtained results. In this sense, it is essential to maintain internal communication consistent with the institutional philosophy and organizational objectives, considering that employee well-being in the sales department can translate into direct benefits in customer relations.

Analyzing the relationship between culture and the achievement of strategic objectives, Méndez (2019) highlights that culture and strategy are interconnected in adapting to environmental changes, generating value, and creating competitive advantages, particularly in alignment with the organization's mission and vision. Moreover, culture strengthens corporate identity and fosters a sense of belonging, commitment, and the attainment of results through strategic actions, thus maintaining an interdependent relationship between both elements.

Organizational culture and organizational philosophy are closely linked because culture is the practical implementation of the values, beliefs and principles contained in the organizational philosophy, influencing the daily behaviors, norms and functioning of its members. As noted by Pérez (2008), García (2017), and Andrada (2019), organizational philosophy refers to a shared system of core values, beliefs, practices, and knowledge that reflects the ethics and collective psychology of a company. It is shaped by leadership and expressed through the mission, vision, and strategy, guiding the behavior and decision-making of its members. Santos (2023) states that the core elements of organizational philosophy – mission, vision, and values – define the company's strategic focus, stakeholder commitment, and value proposition. These elements are publicly accessible and evolve over time to meet changing needs.

Organizational culture in México

Cultural studies emerged in English-speaking countries in the 1950s-60s as part of a cultural democratization process. In Latin America, their adoption was more recent, influenced by the British tradition but also rooted in regional intellectual currents dating back to 19th-century essays and 20th-century critical thought (Bernal et al., 2015). From the 1930s, this tradition took on a political, mainly Marxist, orientation – solidified after the 1959 Cuban Revolution and the revolutionary movements of the 1960s-70s – shaping a continental discourse linking culture and politics across Latin America.

In Mexico, organizational culture is generally warmer than in other countries, but challenges like gender discrimination and harassment persist, rooted in traditional views of women's roles. Nonetheless, these behaviors are declining as professional attitudes among women grow. Bernal et al. (2015) argue for a new organizational culture that values human potential – encouraging employee creativity and effort while promoting personal development, autonomy, and recognition by employers. Such a model could enhance productivity, innovation, and employee commitment in a competitive global context.

Below is key information regarding the organizational culture and market position of selected airlines:

- **Vuela Compañía de Aviación, S.A.P.I. de C.V.** – This company has been recognized by 5050 Women on Boards and Women Corporate Directors for having one of the highest levels of female representation on its board among publicly traded companies. Women also hold 87% of operational roles and 26% of management positions within the company (Revista Turismo, 2023). In line with International Women's Day, Volaris reaffirmed its commitment to an inclusive organizational culture through policies that promote equity. For over 15 years, gender equality has been a core part of its organizational strategy, aimed at fostering optimal conditions for employee performance. Women represent 47% of Volaris' workforce – referred to as "Ambassadors" – with a notable female presence in operational (87%) and management (26%) roles, including one female captain for every two aircraft. Additionally, this company became the leading

airline in Mexico's commercial air transport market, holding a 26.6% share, ahead of Aeroméxico and Viva Aerobus (Redacción El Economista, 2022).

– **Aeroenlaces Nacionales, S.A. de C.V.** – Viva Aerobus, a Mexican airline, promotes an inclusive organizational culture and aims to be a leader in this area. As part of its commitment to diversity, it temporarily changed its logo to rainbow colors during LGBTQ+ Pride Month (La Agencia de Viajes México, 2021). This company integrates values like tolerance, respect, and equality into its institutional philosophy, affirming that all individuals deserve dignified treatment regardless of sexual orientation. Since 2020, it has been recognized as one of the best companies to work for LGBTQ+ individuals, thanks to its inclusive corporate culture and compliance with the three criteria set by the Human Rights Campaign (HRC) Foundation: anti-discrimination policies, development of LGBT+ competencies – including a Diversity and Inclusion Committee – and commitment to the public through impactful actions (Transporte.mx, 2021).
– **Aerovías de México S.A. de C.V.** – Aeroméxico, one of Mexico's most recognized airlines, currently holds the second-largest market share after Interjet. Nevertheless, its share declined slightly compared to 2019, a change attributed to shifts in its organizational culture during that period (Redacción El Economista, 2022). According to Pineda (2019, 2023), this company hired a cultural change specialist in 2017 to foster a customer-oriented culture. This led to digital transformation in 2019 and the launch of a company-wide training program to align processes and behaviors, especially in customer service. In recent years, the airline has redefined its culture through development, training, and inclusion initiatives, promoting a unified, customer-centric approach. These efforts have improved efficiency and strengthened its position in the industry.

Methods

This study adopted a mixed qualitative-quantitative approach with a nonexperimental, longitudinal design. It analyzed the organizational culture of three major Mexican airlines – Volaris, Viva Aerobus, and Aeroméxico – while simultaneously measuring their market share between 2019 and 2024. This period was selected to capture pre-pandemic stability, the disruption caused by COVID-19, and the subsequent recovery, offering a comprehensive perspective on how cultural practices adapted under critical conditions (Hernández, Fernández & Baptista, 2014).

The qualitative data on organizational culture were collected from secondary sources (company reports, annual statements, official websites, and public documents). The quantitative data, such as annual sales and market share, were obtained from official aviation authorities and company financial statements. The comparison criteria focused on three dimensions: (1) mission, vision, and values; (2) cultural initiatives related to inclusion, diversity, and customer orientation; and (3) financial performance indicators.

A main limitation of the study is the reliance on secondary, self-reported data, which may restrict the depth of cultural analysis and carry potential biases. Nevertheless, triangulating multiple sources and combining qualitative and quantitative evidence strengthens the robustness of the findings.

Results

Volaris has experienced significant growth in recent years, maintaining the largest market share from 2019 to 2024. While various factors contribute to this success, the following tables highlight the role of organizational culture in supporting the company's performance.

Table 1. Company approach to organizational culture

Company	Organizational culture approach
Volaris	The company's customer-focused culture promotes gender equality through inclusive policies and equal opportunities for both women and men.
Viva Aerobus	It fosters a diverse, customer-oriented culture based on respect and inclusion.
Aeroméxico	Its approach centers on customer development by continually identifying unmet needs.

Source: Authors' own elaboration

Table 1 shows that the three airlines share a customer-focused orientation, but with different emphases. Volaris highlights gender equality, Viva Aerobus fosters inclusion and diversity, and Aeroméxico emphasizes customer development.

Table 2. Mission, vision and values

Company	Mission	Vision	Values
Volaris	With top talent and low costs, we make quality travel accessible to more people.	Create and embody exceptional travel experiences.	Security, customer service, sustained profitability, credibility, respect, impartiality, companionship and pride.
Viva Aerobus	We aim to make travel more affordable so people can enjoy themselves, do business, and connect with loved ones.	The most popular, fun, and profitable low-cost airline in the Americas.	Customer priority, honesty, consistency, teamwork, innovation, authenticity, and passion.
Aeroméxico	Elevate travel into an extraordinary, responsible experience.	Leading sustainable aviation.	Sustained growth, consistent service, safety, and discipline.

Source: Prepared based on Volaris (2019); Volaris (2023a); Viva Aerobus (2023b); Aeroméxico (2023)

As seen in Table 2, all three companies emphasize customer service and continuous improvement in their missions and visions. Volaris incorporates impartiality and pride, Viva Aerobus highlights innovation and authenticity, while Aeroméxico stresses sustainability and discipline.

Table 3. Type of culture and market share

Company	Organizational culture	Market share			
		2019	2022	2023	2024
Volaris	Customer orientation	19.9%	26.3%	25.4%	22.4%
Aeroméxico	Customer orientation	20.1%	18.1%	20.6%	21.8%
Viva Aerobús	Customer orientation	11.1%	20.0%	19.8%	20.9%

Source: Based on Agencia Federal de Aviación Civil (2020, 2023, 2024, 2025)

Table 3 reveals the evolution of market share. Volaris consolidated its leadership between 2019 and 2022, while Aeroméxico stabilized after a slight decline. Viva Aerobus significantly expanded, reaching almost the same level as Aeroméxico by 2024. These trends suggest that cultural orientation – particularly inclusivity and customer service – has strengthened market presence.

Table 4. Airline revenues in dollars during 2019-2024

Airline	**Revenue**					
	2019	**2020**	**2021**	**2022**	**2023**	**2024**
Volaris	1,788,212	1,077,091	2,103,499	2,739,427	3,123,524	3,009,699
Aeroméxico	3,645.16	1,511.91	2,409.83	3,402.4	4,504.2	4,504.2
Viva Aerobús	682,430.43	435,789.37	346,003.34	1,461,226	668,714	650,223

Source: based on Grupo Aeroméxico (2022); Grupo Aeroméxico (2025); Viva Aerobús (2020); Viva Aerobús (2021); Viva Aerobús (2022); Viva Aerobús (2023a); Viva Aerobús (2025); Volaris (2020) Volaris (2021); Volaris (2022); Volaris (2023b); Volaris (2024); Volaris (2025a)

Table 4 indicates that Volaris experienced the strongest financial rebound after the pandemic, Aeroméxico achieved a steady recovery through digital transformation, and Viva Aerobus displayed fluctuations but consolidated its competitive position through inclusive branding.

Taken together, the evidence in Tables 1-4 confirms that organizational culture directly influences both market share and income. Volaris's inclusivity policies, Viva Aerobus's diversity initiatives, and Aeroméxico's digital transformation represent distinct cultural strategies that explain their respective performance patterns and competitive positioning.

Discussion

The findings indicate that the effective management of organizational culture has a direct positive impact on income and market share. This aligns with Kotter and Heskett's (1992) seminal study Corporate Culture and Performance, which analyzed 207 U.S. companies over eleven years and found that those with strong cultural management achieved significantly higher revenue, stock value, and net income growth compared to those without. These results highlight the strategic importance of cultivating a well-managed organizational culture (Rick, 2015).

In the case of Mexican airlines, cultural practices are not merely symbolic but translate into measurable outcomes. When organizational culture prioritizes inclusion, customer orientation, and adaptability, airlines are better positioned to expand their market presence and achieve financial resilience. Volaris's gender policies, Viva Aerobus's diversity practices, and Aeroméxico's digital transformation efforts each represent distinct cultural strategies that have contributed to competitive performance. These findings are consistent with Naranjo-Valencia, Jiménez, and Sanz-Valle (2012), who argue that organizational culture can stimulate or inhibit innovation, and in line with Bernal, Ochoa, and Álvarez (2015), who emphasize that cultivating a strong culture fosters collaboration and quality service.

Similar conclusions are supported in the broader Latin American context. Torres, Uvidia, and Carapaz (2021) emphasize that accurately diagnosing organizational culture is crucial for maintaining competitiveness as employee behavior reflects cultural alignment. Their study of Peruvian companies revealed a 68% effectiveness rate in teamwork, illustrating the direct influence of culture on role conformity. Likewise, Meza-Lizárraga, Palacios-Gómez, and Pérez-Lizárraga (2025) argue that a culture promoting motivation, collaboration, and commitment significantly enhances productivity. Thus, strengthening organizational culture should be considered a strategic priority to improve performance and achieve goals more efficiently.

However, these results must be contextualized. The practices observed in Volaris, Viva Aerobus, and Aeroméxico reflect the particular dynamics of the Mexican airline industry, characterized by strong competition among low-cost carriers and increasing social demands for inclusivity. As Porter (2007) suggests, cultural context directly influences consumer values and organizational behavior, which means that the generalizability of these findings to other countries or industries may be limited.

Conclusion

The analysis confirms a strong correlation between organizational culture, sales, and market share. These elements are interdependent: when a company cultivates a well-defined and customer-focused culture, it strengthens its relationship with clients, increasing satisfaction, loyalty, and ultimately market performance. This is consistent with Kotter and Heskett's (1992) argument that strong cultural management fosters long-term competitiveness.

Volaris exemplifies this dynamic, positioning its culture as a differentiator through inclusive values and gender equality policies that have contributed to its recognition as a top employer, particularly for women. Similarly, Viva Aerobus has consolidated its market position through inclusion and diversity initiatives, while Aeroméxico has invested in digital transformation and customer-oriented practices to enhance resilience. These cases demonstrate that success lies not in replicating competitors' models but in cultivating authentic cultural strategies aligned with organizational values and objectives (Naranjo-Valencia et al., 2012; Bernal et al., 2015).

Organizational culture also shapes how employees engage with customers. When effectively communicated – rather than imposed – it becomes part of employees'

professional identity and is reflected in the service they deliver, reinforcing the idea that culture operates as a strategic differentiator (Guerrero, 2020).

Nonetheless, challenges persist. As Méndez, Rosales, and Delgado (2020) note, consumers in the low-cost airline sector are increasingly demanding. Despite Volaris leading the market, it continues to face operational issues such as overbooking, delays, and weak service recovery mechanisms. These weaknesses suggest that cultural alignment must be complemented with improvements in operational efficiency and service quality (Volaris, 2025b).

In summary, this study highlights that organizational culture functions as a competitive advantage for Mexican airlines, influencing both market share and financial outcomes. Nevertheless, the findings are context-specific: practices such as gender equality initiatives, inclusivity, and customer orientation reflect the dynamics of the Mexican aviation industry, which is highly competitive and dominated by low-cost carriers. As Porter (2007) emphasizes, cultural context shapes consumer behavior, limiting the generalizability of results to other regions.

Future research should expand this analysis to other Latin American or international airlines, incorporating primary data – such as employee surveys or interviews – to capture internal perceptions of culture and assess whether similar strategies generate comparable results in different institutional contexts.

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KULTURA ORGANIZACYJNA JAKO PRZEWAGA KONKURENCYJNA: PRZYPADEK MEKSYKAŃSKICH LINII LOTNICZYCH

Streszczenie: Organizacje nieustannie wprowadzają innowacje, aby dostosować się do dynamicznie zmieniającego się rynku, a przede wszystkim sprostać konkurencji. Kultura organizacyjna jest niematerialnym zasobem, niezbędnym do ich zdolności adaptacyjnych. Celem niniejszej pracy jest analiza kultury organizacyjnej firm: Concesionaria Vuela Compañía de Aviación, S.A.P.I. de C.V. (Volaris), Aeroenlaces Nacionales, S.A. de C.V. (Viva Aerobus) oraz Aerovías de México S.A. de C.V. (Aeroméxico), w celu zidentyfikowania elementów, które obecnie działają jako czynnik różnicujący i konkurencyjny. Warto wspomnieć, że mimo iż ostatnia z wymienionych firm już nie prowadzi działalności, jej analiza pozostaje istotna dla tego badania. Zastosowano metodologię o podejściu ilościowym, z podłużnym (longitudinalnym), nieeksperymentalnym projektem badawczym, który mierzył udział w rynku konkurencyjnych firm oraz analizowanej spółki, porównując wysiłki wkładane w rozwój odpowiedniej kultury organizacyjnej w każdej z nich. Dodatkowo potwierdzono postawioną hipotezę, że kultura organizacyjna działa jako element przewagi konkurencyjnej dla firm z sektora. Podsumowując: kultura rzeczywiście stanowi czynnik różnicujący w przedsiębiorstwie, ponieważ – oprócz powiązania z wartościami firmy – pozwala pracownikom je wyrażać, co przekłada się na lepsze doświadczenia klientów.

Słowa kluczowe: przemysł lotniczy, przewaga konkurencyjna, kultura organizacyjna

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COMMUNITY PERCEPTION OF LITHIUM EXTRACTION IN SAN AGUSTIN METZQUITITLAN, HIDALGO, MEXICO

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Abstract: The growing demand for lithium as a strategic resource has sparked interest in its extraction in various regions of Mexico, including San Agustín Metzquititlán, Hidalgo. This research is part of a mixed-methods study titled "Design of Sustainable Business Management Strategies for Lithium Extraction from the Social Perspective of the Community of San Agustín Metzquititlán, Hidalgo." This article adopts a qualitative approach in its first phase, aiming to explore in depth the perceptions, meanings, and social experiences related to the potential lithium extraction in this community. The objective was to understand the perceptions of those holding public office or serving as community representatives. A phenomenological design was used to understand how local actors, including community authorities, experience, interpret, and evaluate the potential presence of lithium extraction projects in their territories. A purposive sampling method based on criteria was applied, prioritizing key actors with knowledge of the local social, economic, and environmental context. Semi-structured interviews were conducted. The topics addressed revolved around territorial identity, environmental concerns, development expectations, institutional trust, and past experiences with external actors. The findings revealed an ambivalent attitude within the community: on the one hand, there is recognition of lithium's economic value as a development opportunity; on the other hand, there is intense fear of water pollution, the loss of communal land, and the disruption of the social fabric. A demand for more information, active participation in decision-making, and respect for community self-determina-

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tion was also expressed. These qualitative results provide the foundation for designing sustainable management strategies that respond to the social reality of the territory and to its inhabitants' voices.

Keywords: community perception, lithium, sustainable management

JEL Classification: L72, M14, Q01, Q556, R11

Introduction

Although global lithium production is dominated by countries such as Australia, Chile and China, Mexico has recently drawn attention for its emerging potential in the lithium sector. Unlike these established producers, Mexico faces unique socio-environmental and regulatory challenges linked to its mining governance structure and community relations. Therefore, examining the Mexican case, particularly in rural territories such as San Agustín Metzquititlán, provides valuable insights into how a new lithium-producing country may balance industrial ambitions with social and environmental responsibility.

The global energy transition has positioned lithium as a fundamental strategic resource for developing clean technologies, particularly in producing batteries for electric vehicles and energy storage systems. In this context, Mexico has emerged as a country of interest for lithium exploration and extraction, due to the presence of deposits in various regions across the country. In February 2023, a decree was issued declaring lithium as the nation's property. This decree modified the Mining Law and created a state-owned company in charge of lithium exploitation, named Litio para México. Specifically, the state of Hidalgo – and within it, the municipality of San Agustín Metzquititlán – has attracted interest due to its mining potential and rich biodiversity.

However, beyond the economic appeal of this extractive activity, it is essential to analyze the potential social and environmental impacts it may entail, particularly in rural communities that have historically faced external intervention processes without adequate consultation mechanisms or effective participation. Experience in other regions of Latin America has shown that mining projects that do not take local voices into account can generate socio-environmental conflicts, loss of institutional trust, and ecosystem degradation.

In this sense, social perception is a key component in understanding the viability of extractive projects from a sustainable perspective. The acceptance or rejection of such initiatives depends not only on the promised economic benefits but also on how communities assess risks, relate to their environment, and participate in decision-making processes.

Recent studies (Orozco Martínez, 2020; Fuentes Claros, 2020; Fernández Valdiviezo, 2021) have emphasized the need to incorporate participatory and ethical approaches in the management of natural resources, recognizing the right of communities to protect their territory, health, and way of life.

Within this framework, the present article is part of a broader research project titled Design of Sustainable Business Management Strategies for Lithium Extraction

from the Social Perspective of the Community of San Agustín Metzquititlán, Hidalgo. The research follows a mixed-methods approach with an exploratory sequential design. In this initial phase, a qualitative approach is adopted to deeply explore the perceptions, concerns, and expectations of key stakeholders within the community, mainly municipal authorities and local representatives, regarding the potential establishment of a lithium extraction project in the region.

The main objective is to understand how these actors interpret the possible arrival of lithium mining on their territory, what risks and opportunities they identify, and what conditions they consider necessary to accept the process from a socially responsible perspective. Through semi-structured interviews and a phenomenological analysis, the study reconstructs the meanings that the community attributes to territory, development, and mining activity, generating key input for the subsequent design of sustainable strategies that genuinely incorporate the community's voice.

Literature review

Lithium has emerged as a strategic mineral for the global economy in recent years due to its pivotal role in clean technologies and the energy transition.

The social perception of lithium extraction, akin to that of other strategic minerals, has become a decisive factor in determining the feasibility of mining projects. Contemporary debates on lithium exploitation extend beyond technological efficiency and supply security, encompassing broader issues of environmental integrity and social acceptance. Research indicates that in regions where local communities perceive mining as a threat to the environment, public health, or traditional livelihoods, resistance to extractive activities intensifies (Petavratzi et al., 2022; Graham et al., 2021). As Petavratzi et al. (2022) emphasize, social acceptance directly influences the operational viability of mining projects, making transparent and trust-based relationships between companies and surrounding communities essential. Public image, operational transparency, and genuine stakeholder participation in the industry are critical to acquiring and maintaining the social license to operate (SLO) (Thambi, 2019; Que et al., 2018). Without such engagement, socio-environmental conflicts may escalate, potentially delaying or halting projects altogether.

Therefore, sustainable lithium resource management must address not only economic considerations, but also the cultural and historical conditions specific to each territory (Barandiarán, 2019). Scholars such as Que et al. (2018) and Heredia et al. (2020) highlight that robust community consultation processes are crucial for preventing conflicts and fostering collaborative solutions. A co-responsibility model, where local communities are recognized as rights-holders rather than merely stakeholders, can enhance long-term trust and reduce the risk of conflict. Implementing modern, less invasive technologies with transparent consultation mechanisms offers a path to reconciling economic development with environmental protection and social well-being.

Recent literature also notes a shift in the mining sector, with companies increasingly prioritizing social and community issues under growing pressure to assume responsibility for the impacts of their operations (Thambi, 2019; Dong et al., 2024).

For example, Agusdinata et al. (2018) advocate for socio-environmental impact assessments guided by community engagement, ensuring that local concerns shape operational strategies. Likewise, Gundermann and Göbel (2018) point to the need to transform company–community relations from paternalistic models to partnerships based on shared values, which can significantly enhance cooperation and foster sustainable development in mining regions.

Ultimately, lithium extraction will continue to be scrutinized through the lens of sustainable development, requiring constant evaluation of technologies and practices that prioritize ecological preservation and community welfare. Effective collaboration among governments, industry, and local communities is essential to embedding sustainability into mining governance – promoting an approach that aligns economic growth with environmental stewardship (Petavratzi et al., 2022; Heredia et al., 2020).

Lithium is essential for producing batteries used in electric vehicles, mobile devices, and renewable energy storage systems. As nations pursue decarbonization and commit to reducing their carbon footprints, the demand for lithium has skyrocketed. This demand is projected to continue to grow exponentially over the coming decades (Ategui, 2023).

This mineral boom, however, is accompanied by growing concerns. One of the key issues is the concentration of lithium production. Currently, over 80% of the world's lithium supply comes from just two countries: Australia and Chile. This geographical concentration creates significant vulnerabilities in the global supply chain and increases the pressure to explore and exploit new lithium reserves, particularly in Latin America (Ategui, 2023; Sánchez-Mancera & Pérez-Garibay, 2003). Mexico is gaining strategic importance among the countries being explored due to its untapped lithium deposits, particularly in Sonora and other states such as Hidalgo.

The expansion of lithium mining has sparked debate among scholars and environmental advocates regarding its sustainability. Studies such as those by Barría Uribe (2021) and Sticco et al. (2021) document the serious environmental consequences of lithium extraction in South America. Research has shown that in the Salar de Atacama in Chile, the Salar de Uyuni in Bolivia, and the Argentine Altiplano, lithium mining depletes groundwater, contaminates water sources, and causes irreversible damage to fragile ecosystems. These impacts are magnified by extractive methods, such as evaporation ponds, which are highly water intensive.

Jiménez Montoya (2020) highlights that lithium extraction has compromised not only the ecological balance but also public health and traditional livelihoods, including pastoralism and small-scale agriculture in Bolivia. Similarly, Olvera (2020) warns that Mexico may face similar outcomes if lessons from neighboring countries are not considered. He points to a lack of preparedness regarding environmental legislation, oversight, and community consultation, which could exacerbate socio-environmental conflict.

Research conducted in Argentina by Fernández (2021) and Fernández Valdiviezo (2021) provides further insight into the social conflicts surrounding lithium mining. Their findings suggest that resistance to mining projects increases when communities are not adequately informed, consulted, or included in decision-making processes. These studies emphasize the symbolic value of the territories for local

populations, beyond their economic potential. The exclusion of indigenous and rural communities from extractive projects often leads to social fragmentation and mistrust.

The role of social perception is another critical aspect in evaluating mining projects. Orozco Martínez (2020), in her investigation of the 2014 toxic spill in the Sonora River, Mexico, demonstrates how public distrust can shape resistance to extractive industries. Using a mixed-method approach, she found that people's attitudes toward mining were influenced not only by direct environmental damage but also by past experiences, the perceived lack of transparency of corporations, and weak institutional accountability. Such perceptions directly impact the social license for mining companies to operate.

This underscores the importance of incorporating ethical and socially responsible frameworks into extractive strategies. Hernández Coronel (2020) argues that achieving the Sustainable Development Goals (SDGs) requires companies to adopt a new organizational culture. This includes prioritizing social responsibility, sustainable innovation, and participatory governance. In this sense, extractive industries must move from an exploitation model to one of co-responsibility, where communities are recognized as rights-holders, not just stakeholders.

The academic literature also stresses the need for integrative methodological approaches. Hernández Sampieri et al. (2022) advocate using mixed methods to address the complexity of social phenomena linked to resource extraction. Their approach supports triangulating quantitative data with qualitative insights to fully understand how communities perceive, react to, and adapt to the presence of large-scale mining projects. This holistic view is essential in territories with layered historical, environmental, and cultural dynamics.

Moreover, environmental sustainability must be understood as interconnected with social justice. Fuentes Claros (2020), examining the Bolivian case, calls attention to the contradiction between economic development and water security. Lithium extraction often occurs in arid regions where water is already scarce, leading to disputes over access and rights. Local populations bear the brunt of these impacts, often without reaping the economic benefits promised by mining companies.

In addition, Sticco et al. (2021) present compelling evidence on how lithium mining affects wetlands and water systems, particularly in high-altitude environments where hydrological cycles are delicate and poorly understood. These authors recommend a moratorium on new lithium projects until rigorous environmental assessments can be conducted with local participation.

Finally, examining how national policies shape the mining landscape is essential. Sánchez-Mancera and Pérez-Garibay (2003) offer a historical account of lithium in Mexico, arguing that the country's mining laws and institutional frameworks have traditionally prioritized foreign investment over community rights. While legal reforms have attempted to address these imbalances, enforcement remains weak, and the power asymmetry between corporations and local populations persists.

In conclusion, the literature reviewed presents a multifaceted panorama of lithium extraction in Latin America, marked by environmental degradation, socio-political conflict, and ethical dilemmas. At the heart of these issues lies the need to redefine

how we conceptualize development. Rather than imposing extractive models that ignore local realities, sustainable mining must be grounded in intercultural dialogue, community empowerment, and respect for ecological limits.

The case of San Agustín Metzquititlán, in Hidalgo, Mexico, is emblematic of these broader regional tensions. As lithium exploration expands into new territories, it is crucial that communities are not only informed but also actively involved in shaping the future of their lands. This participatory approach, supported by robust environmental science and ethical business practices, may provide a pathway toward a more just and sustainable form of mineral governance.

Methods

From a methodological perspective, Hernández Sampieri et al. (2022) highlight the importance of using mixed and participatory approaches to capture the multiple dimensions of social reality. The combination of qualitative and quantitative techniques enables the identification of patterns and trends, while also facilitating a deeper understanding of the meanings that social actors attribute to territory, the environment, and the projects that affect them.

This research adopts a mixed-methods approach with an exploratory sequential design (DEXPLOS). In the first phase, a qualitative approach was implemented through semi-structured interviews with key individuals from the municipality of San Agustín Metzquititlán, including municipal authorities and public servants. The interviews explored topics such as community perception, knowledge about lithium, perceived impacts, community participation, and expectations toward mining companies.

The interviews were conducted in June 2025. A total of ten participants were selected through purposive sampling, including municipal authorities, local representatives, and public servants directly involved in community development. The inclusion criteria focused on individuals with decision-making responsibilities or relevant knowledge about the potential lithium extraction project. Each interview lasted between 45 and 60 minutes and was conducted in person at the municipal offices. The participants provided informed consent, and all interviews were audio-recorded and transcribed verbatim for subsequent analysis.

The data were analyzed using thematic coding based on a phenomenological approach, allowing the identification of discursive patterns, shared concerns, and community-driven proposals for action. To support this process, ATLAS.ti software (version 25) was used for data organization, coding, and visualization. Additionally, word clouds were generated to illustrate the most frequent terms and co-occurrences in participants' discourse, offering a graphical overview of the predominant perceptions of the community.

It is important to note that the quantitative phase will apply a correlational design derived from the variables identified in this qualitative stage, enabling the validation and expansion of the emerging findings.

Results

The gathered testimonies provide a broad and meaningful vision of the community of San Agustín Metzquititlán from the perspective of those holding key positions in municipal administration and actively participating in decision-making about potential lithium extraction. These voices reveal a community with defined characteristics, deeply rooted values, and legitimate concerns regarding potential mining development.

Respondents commonly described San Agustín Metzquititlán as a small community focused mainly on commerce and agriculture. The population is seen as friendly, supportive, and receptive, though also expressing concerns about the arrival of outsiders and the potential impact of mining on the environment and daily life.

Highlighted aspects include the presence of skilled human talent and a diverse natural environment, elements considered strengths for sustainable project development. However, concerns also emerged regarding environmental degradation, limited available information on the mining project, and uncertainty about how social and ecological impacts would be managed.

While potential economic benefits such as job creation and increased local economic flow were acknowledged, fears were also expressed regarding environmental risks, health impacts, and a possible rise in crime associated with increased human mobility.

In this context, the participants suggested various strategies to improve the relationship between the community, the environment, and the companies interested in lithium exploitation. These included consultation forums, active community involvement in decision-making, and demands for transparency and accountability from involved companies. The emphasis was placed on prioritizing the well-being of the population and protecting the natural environment in any development project implemented in the region.

The interviewees' expectations revolved around providing decent jobs, effective measures to mitigate extraction-related negative effects, and creating educational programs to prepare the local workforce for future opportunities.

Throughout the interviews, there was a recurring concern about the lack of clear information on the project and the need for constant dialogue between the community and the companies. This interaction with responsibility, fairness, and sustainability is the key to ensuring that any mining initiative is carried out.

In summary, the testimonies collected reflect a community that is aware of its strengths and concerns and expects to be heard and considered. Active participation in the planning and supervision of the project, along with access to truthful and timely information, are fundamental elements that, according to participants, will enable progress towards a more just and balanced development for San Agustín Metzquititlán.

Table 1. Thematic categories on community perception of lithium extraction

Category	Interviewees' Perception
Community Description	Small, united community focused on commerce and agriculture; friendly, receptive, cooperative population
Local Strengths	Skilled human capital, diverse natural environment, willingness to work, and the ability to generate employment alternatives
Environmental Concerns	Possible environmental degradation, pollution, and impact on residents' health
Social Concerns	Arrival of outsiders, potential increase in crime, and lack of information about the project
Economic Expectations	Job creation, increased local economic activity, and a boost to local trade
Demands to Companies	Transparency, social and environmental responsibility, and community inclusion in decision-making
Community Proposals	Informative forums, working groups, job training programs, and binding community consultations
Urgent Needs	Access to clear information, constant dialogue, and community oversight of company actions

Source: (Hernandez, Gomez & Mendoza, 2025). Own elaboration based on interviews conducted in San Agustin Metzquititlan

Thematic analysis and concept visualization

As part of the qualitative analysis, a concept cloud was developed based on the most frequently used words in the testimonies collected through semi-structured interviews. This visual tool quickly identifies the terms that most often emerged in local actors' discourse, providing clues about their main concerns, expectations, and perceptions.

Figure 1 shows how terms such as community, extraction, company, municipality, and lithium stand out significantly, reflecting the central theme of the conversations: the relationship between the extractive project and the community environment. Likewise, words such as information, environmental, benefit, population, authority, meeting, fear, and participate reveal the most sensitive topics and key elements that participants consider relevant for accepting – or questioning – the project.

These words indicate not only frequency but also emotional intensity and symbolic value. For example, the presence of terms like fear, impact, protect, or problem reveals a latent concern about potential adverse effects. In contrast, expressions such as work, strength, benefit, and plan reflect the community's interest in actively participating in development processes, as long as their conditions are respected.

This concept cloud serves as an initial representation of the community's discursive universe. The visual findings reinforce the results obtained through thematic coding and constitute a solid foundation for designing the quantitative instrument in the following research phase. This will seek to establish correlations between variables such as information level, impact perception, and project acceptance.

Figure 1. Concept cloud generated from interview analysis

Source: (Hernandez, Gomez & Mendoza, 2025). Own study based on research

Conclusion

This study reveals that the potential lithium extraction in San Agustin Metzquititlán generates both expectations and concerns among local actors, particularly those in key municipal positions. While the economic potential of this activity is acknowledged – in terms of employment, commercial stimulation, and regional development – its acceptance is clearly conditional upon essential factors: respect for the territory, access to clear and truthful information, process transparency, and above all, the active participation of the community in every project phase.

The collected testimonies portray a community aware of its resources and capabilities, yet alert to the environmental, social, and cultural risks of a poorly managed mining operation. The community does not categorically oppose the extractive project but instead proposes a co-responsibility approach, where decisions are not imposed but built collectively through dialogue and consultation.

Furthermore, the demand for ethical and responsible behavior from the involved companies is emphasized, calling for open communication, transparency, and the generation of dignified employment opportunities for locals. Concerns about pollu-

tion, safety, and potential disruption of the social fabric reinforce the need for a preventive and comprehensive approach that considers both the benefits and risks of mining activity.

In this context, it is concluded that it is essential to promote sustainable business management strategies that incorporate genuine mechanisms for community participation from the early planning stages. Sustainability cannot be understood solely in economic or environmental terms, but also from a social dimension that values local knowledge, respects community identity, and promotes territorial justice.

Finally, the results of this qualitative stage provide key elements for the design of more inclusive business practices, which recognize communities not only as intervention settings but as legitimate actors, with a voice and the ability to influence decisions that affect their present and future.

As a limitation, this study focused exclusively on municipal authorities and local representatives, which may not fully capture the perceptions of the broader community, including residents without administrative roles. Future research should therefore expand the sample to include diverse social groups and quantitative measures that validate the qualitative findings.

As a projection, these findings will inform the next phase of the research, which will follow a quantitative and correlational approach aimed at analyzing the relationship between the variables of community perception, sustainability, available information level, and best practices. This upcoming stage will make it possible to validate the patterns and trends identified in the narratives, as well as to generate statistical evidence that supports and expands the comprehensive understanding of the social and environmental phenomenon under study, strengthening the proposal for sustainable management from technical, environmental, and social perspectives.

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POSTRZEGANIE WYDOBYCIA LITU PRZEZ SPOŁECZNOŚĆ SAN AGUSTÍN METZQUITITLÁN, HIDALGO, MEKSYK

Streszczenie: Rosnące zapotrzebowanie na lit jako surowiec strategiczny wzbudziło zainteresowanie jego wydobyciem w różnych regionach Meksyku, w tym w San Agustín Metzquititlán, Hidalgo. Niniejsze badanie stanowi część badania mieszanego pt. „Projektowanie strategii zrównoważonego zarządzania przedsiębiorstwem dla wydobycia litu z perspektywy społecznej wspólnoty San Agustín Metzquititlán, Hidalgo". W artykule przedstawiono pierwszą, jakościową fazę badania, mającą na celu dogłębne zbadanie percepcji, znaczeń i doświadczeń społecznych związanych z potencjalnym wydobyciem litu w tej społeczności. Celem było poznanie opinii osób pełniących funkcje publiczne lub reprezentujących społeczność. Zastosowano podejście fenomenologiczne, aby zrozumieć, w jaki sposób lokalni aktorzy – w tym władze wspólnoty – doświadczają, interpretują i oceniają możliwą obecność projektów wydobycia litu na ich terytorium. Zastosowano celowy dobór próby oparty na kryteriach, koncentrując się na kluczowych osobach posiadających wiedzę o lokalnym kontekście społecznym, ekonomicznym i środowiskowym. Przeprowadzono wywiady częściowo ustrukturyzowane. Poruszane tematy dotyczyły tożsamości terytorialnej, obaw środowiskowych, oczekiwań rozwojowych, zaufania do instytucji oraz wcześniejszych doświadczeń z podmiotami zewnętrznymi. Wyniki ujawniły ambiwalentną postawę społeczności: z jednej strony dostrzega się wartość gospodarczą litu jako szansę na rozwój; z drugiej – występuje silny lęk przed zanieczyszczeniem wody, utratą gruntów wspólnotowych oraz naruszeniem więzi społecznych. Zgłaszano również potrzebę uzyskania większej ilości informacji, aktywnego udziału w podejmowaniu decyzji oraz poszanowania prawa wspólnoty do samostanowienia. Uzyskane wyniki jakościowe stanowią podstawę do opracowania strategii zrównoważonego zarządzania, które odpowiadają realiom społecznym tego terytorium i głosom jego mieszkańców.

Słowa kluczowe: postrzeganie wspólnoty, lit, zrównoważone zarządzanie

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ADVERTISING CAMPAIGNS FOR SUNSCREEN PRODUCTS OF COSMETIC BRANDS

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Abstract: The article aims to evaluate advertising campaigns for sunscreen products from cosmetic brands. A detailed analysis was conducted of brands such as Holika Holika, La Roche-Posay, and Nivea and their marketing activities to promote sunscreen products. The analysis was carried out using critical analysis, desk research and a scoring method. The considerations presented are of an illustrative and preliminary nature. The authors described selected issues related to advertising campaigns and types of sunscreen products. The central part of the discussion presents an analysis of the activities of selected cosmetic brands, including an evaluation performed using the scoring method. In the empirical part, particular attention is paid to aspects such as communication channels, methods of engaging the audience, visual appeal, and the effectiveness of activities. The analysed aspects were rated on a scale of 1 to 10 points. They assigned the following weights: 0.2 for communication channels, 0.2 for audience engagement methods, 0.2 for visual attractiveness, and 0.4 for the effectiveness of health education activities. The authors tried to identify the assumptions adopted by the cosmetic brands in promoting sun protection within their marketing activities. The comparison of different approaches highlights the importance of considering the needs, values, and preferences of the audience when designing marketing communication. The analysed brands create educational messages for their advertising campaigns, including content that communicates the adverse effects of ultraviolet radiation on the skin.

Keywords: advertising campaigns, cosmetic brands, marketing communication, point evaluation, sunscreen products

JEL Classification: M31, M37, M14, I12

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Introduction

Contemporary advertising campaigns by cosmetic brands also address content related to consumer education and the impact of their products on health. Marketing initiatives align with the growing expectations of the consumer audience, which are increasingly concentrated on authenticity and representation in advertising (Ustymenko, 2023). Including these aspects in advertising messages allows cosmetic brands to shape their relationships with consumers, emphasising their commitment to important activities dedicated to popularising and promoting healthy behaviours (Portilho et al., 2022). One such activity involves communicating issues related to sun protection, a crucial aspect of skin care that affects both appearance and health. There has been growing awareness of the risks associated with excessive exposure to ultraviolet radiation, which has led to increased interest in sunscreen cosmetics and the launch of targeted advertising campaigns that address this concern. In statutory terms, a cosmetic product is defined as „any substance or mixture intended to come into contact with the external parts of the human body (epidermis, hair, nails, lips and external genitalia) or with the teeth and mucous membranes of the oral cavity, the sole or main purpose of which is to keep them clean, perfume them, change their appearance, protect them, keep them in good condition or correct body odour" (Regulation (EC) No 1223/2009…, 2009).

The general trend suggests that consumers are increasingly making informed choices about products that cater to their individual skin care needs (Arya et al., 2024). Many internal and external factors influence the condition of the skin. Internal factors include age and hormonal balance. As we age, the structure of skin cells changes, contributing to the ageing process (Quan, 2023). The presence of endocrine disruption can also contribute to changes in skin appearance (Resich-Koziel & Niemyjska, 2020). It should be noted that it is not possible to control changes determined by external factors directly; however, their impact can be mitigated. These factors can either harm or improve the condition and appearance of the skin (e.g., stress, stimulants, environmental pollution) or have a positive impact (e.g., proper eating habits, care, regular physical activity) (Resich-Koziel & Niemyjska, 2020).

Literature review

Brand advertising campaigns – selected aspects

An advertising campaign is defined as "an integrated set of advertising activities pursuing a uniform goal" (Grzegorczyk, 2010, p. 237). Its structure depends mainly on the type of product, previously adopted marketing assumptions and the characteristics of the target audience (Kotler & Keller, 2016; Raudeliūnienė et al., 2018). Advertising campaigns are carried out for various purposes. They can be divided into the following categories (Kozłowska, 2016):

- sales, aimed at persuading the recipient to make a purchase,
- image-building, focusing on building brand awareness among consumers.

In addition to the above-mentioned objectives, we should also include those of an educational nature, such as addressing current issues of interest to consumers. Undoubtedly, health issues and the positive effects of specific cosmetics on health can serve as examples. When introducing a new product to the market, a significant condition is to build brand awareness (Huang & Sarigöllü, 2012). Therefore, brands should consider implementing activities that allow them to create an image aligned with their established sales objectives. Properly developed advertising content undoubtedly influences the effectiveness of planned campaigns. First and foremost, this message includes visual and/or audio information prepared by the advertiser to inform and/or convince the audience about a product, organisation or idea. The following main elements of advertising messages can be distinguished: headline, slogan, message content, visual elements such as graphics, audio and video, and a call to action (Sokół-Klein, 2014, pp. 107-109).

As part of the assumptions of the research methodology, aspects of advertising campaigns were discussed, including communication channels, audience engagement methods, visual appeal, and the effectiveness of activities. In the empirical part of the article, the latter aspect concerns activities in the field of health education. The first aspect analysed concerns communication channels. When designing an advertising campaign, the selection should take into account the following conditions (Taranko, 2015, p. 218):

- reach of communication channels – their degree of penetration into the target market,
- opportunities for presenting the message,
- place of impact,
- contact situation,
- length of contact,
- repeatability of contact,
- degree of isolation of competing messages,
- group attitude towards a given channel.

The conditions contribute to the effectiveness of advertising messages and the memorisation of communicated content by recipients. At the campaign planning stage, it is essential not only to consider their needs but also to take appropriate and consistent actions to achieve the desired results.

Another aspect analysed focuses on audience engagement with brands. The creation of this type of consumer attitude is illustrated by behaviours such as shaping attention, strengthening dialogue, building interaction or triggering emotions in the audience environment (Witczak, 2018, p. 72). In the social media environment, consumer engagement manifests itself through their participation in competitions, communication with the brand or sharing content presented as part of campaigns (Medina et al., 2023). Most often, the development of this type of behaviour among consumers generates significant benefits for brands. Furthermore, the literature on the subject suggests a positive relationship between the phenomenon in question and purchasing (Krowicki, 2022).

The visual appeal of advertising campaigns comprises a significant part of the message that not only captures the recipient's attention but also influences their perception, emotions, and purchasing decisions (Tang et al., 2025). As a result, this aspect encompasses not only aesthetic elements but also methods of conveying specific brand values and capturing the consumers' attention (Bočaj & Ahtik, 2023). These elements mainly include colour scheme, graphics, typography techniques, message composition and visual identity.

The last aspect of the advertising campaigns examined concerns the effectiveness of activities. An activity is considered adequate when the degree of achievement of the objective is higher than expected. It is worth noting that the definition of the term effectiveness does not account for the cost of achieving the objective of advertising activities or their economic impact (Taranko, 2015, p. 227). The effectiveness of an advertising campaign from the brand's perspective is primarily assessed based on the profit generated from sales. To evaluate it, various measurement indicators are used to determine the impact on purchasing decisions and the company's financial condition (Olejniczak & Tomorad, 2015). Research on the effectiveness of an advertising campaign should be conducted at all stages of its development, including before it begins, during its execution, and after its completion (Karpińska-Krakowiak, 2015). Marketing research enables the collection of current market data based on the behaviour and preferences of the campaign's audience, allowing for the identification of their reactions and expectations. It is also worth mentioning the monitoring of consumer behaviour and their interaction with the campaign at various stages of the purchasing process (Naim, 2023).

Types of sunscreen products

The global cosmetics market is constantly evolving. Significantly, in Poland, after its accession to the European Union, the value of the cosmetics market increased almost threefold, reaching 25.4 billion PLN in 2023 (Polski Związek Przemysłu Kosmetycznego, 2024, p. 26). It is worth noting that women are the primary purchasers of cosmetic products. It is due to deeply ingrained patterns, often reproduced in the media, which equate women with caring for a healthy and attractive appearance (Aharoni Lir & Ayalon, 2024). However, the literature notes a growing market for skincare products specifically designed for men (Kenalemang-Palm, 2023). Among the fastest-growing categories of cosmetic products are facial care, body care, and makeup (mBank, 2024).

Sun protection has gained particular importance in recent years, as reflected in the increasing popularity of cosmetics with UV filters and the increase in educational efforts on the adverse effects of ultraviolet radiation on the skin (Malinović-Milievć et al., 2025). The range of sunscreen products is extensive, particularly in drugstores and other online shops. There are various types of cosmetics with UV filters, including creams, gels, sprays, lotions, mists, sticks, oils, foams, emulsions, and lotions. Additionally, hair preparations and protective lipsticks with UV filters are becoming increasingly available on the market (Kosmopedia.org). In addition, makeup products with sun protection, such as foundations, BB (beauty balm) creams, CC (colour

control) creams, and face powders, have started to be produced. However, it is essential to note that the protection they provide may not be sufficient, as the likelihood of applying a cosmetic product too thinly or unevenly is high.

Increased consumer awareness and developments in the cosmetic market have contributed to the increasing popularity of products with UV filters (Bahashwan, 2024). For many people, sun protection has become an integral part of their daily skincare routine both due to aesthetic and health concerns. It is worth noting that many aspects of UV filters still require further research to enhance their effectiveness and develop consistent standards for measuring and labelling ultraviolet protection.

Methodology

The objective of the article is to evaluate the advertising campaigns of cosmetic brands of sunscreen products. The authors analysed in detail the marketing activities for promoting sunscreen products such as Holika Holika, La Roche-Posay and Nivea. The following research questions were formulated to deepen and detail the issues analysed:

- How do the analysed brands create the advertising message regarding sunscreen products?
- What is distinctive about the advertising campaigns implemented?

As part of the adopted research convention, critical analysis (Fairclough, 2001) and the desk research method (Guerin et al., 2018) were applied. It was also decided to score the analysed advertising campaigns. This method enables the assessment of any object against a set of established criteria (Gierszewska & Romanowska, 2017; Manczak & Bajak, 2021). It is worth mentioning that the scoring method is based on composing a list of criteria (factors) to describe and differentiate the analysed object (Stabryła, 2011). The distinguished criteria are assigned appropriate weights (not every criterion has the same importance) and numbers of points (scores) from a selected numerical range (Szyran-Resiak, 2016).

The following aspects of the analysed advertising campaigns were assessed:

- communication channels,
- the method of engaging the audience,
- visual attractiveness,
- effectiveness of pro-health education activities.

The highlighted aspects were rated on a scale of 1 to 10 points and assigned the following weights: 0.2 for communication channels, 0.2 for methods of engaging the audience, 0.2 for visual attractiveness, and 0.4 for the effectiveness of health education activities. The authors decided to give the highest importance to the aspect that was mentioned last. This stems from the adopted research assumptions and the interests of the research team.

Secondary data was collected from online sources and social media of brands, which were treated as documents. For further considerations, document analysis was applied, with particular attention paid to the textual component (Glinka & Czakon, 2021). The observation of cosmetic brand profiles was conducted from March 17 to

April 30, 2025. It is worth noting that the current campaigns were not examined; instead, the completed ones were. The Holika Holika brand occasionally continues to use the hashtag #TenGreen in its marketing messages. In this case, the focus was on the most intense period of activity, which fell in June-August 2024. The La Roche-Posay campaign, on the other hand, analysed ongoing activity in the period March-April 2024. During this period, two advertising spots were made available. In contrast, the Nivea brand released two videos in April 2019.

Results

Analysis of selected advertising campaigns of cosmetic brands

Cosmetic brands seeking to reach diverse consumer segments and promote sunscreen creams develop targeted marketing activities that align with the preferences of specific groups and current market trends (Kim et al., 2021). The following discussion attempts to provide an overview of the advertising campaigns of selected cosmetic brands: Holika Holika, La Roche-Posay and Nivea. The authors noted that the featured brands have developed different approaches to promoting their sunscreen products.

Holika Holika is a Korean cosmetic brand that has gained significant popularity in Poland, particularly among Asian skincare. Its cosmetics are available in many online pharmacies, drugstores, stationery stores, and chain stores. The brand's range includes products for skin cleansing, skincare, and makeup (Holika Holika, 2025). Holika Holika actively engages with Polish consumers through social media, regularly publishing posts about products and skincare tips. In addition, Holika Holika maintains a Polish-language website, making it easier for customers to access the range and detailed information about the ingredients and use of the cosmetics. Observing Holika Holika's social media profiles suggests that promoting sunscreen products is a priority for the brand. One example of this is the #TenGreen campaign, which aims to raise awareness of sun protection and promote the Aloe Waterproof Sun Gel cream. For this campaign, the brand focused on solutions that leveraged influencer marketing and social media publishing. The primary target audience for the campaign was young women interested in skincare and make-up. Public relations packages received by several online beauty and skincare influencers, including nano- and micro-influencers, played a significant role in the brand's strategy. When analysing the posts made under the tagline #TenGreen, it can be assumed that the influencers' task was to add a photo or video showing the product, describing how it works, and highlighting the waterproof and high-capacity nature of the cosmetic. In addition, Holika Holika shared promotional graphics, educational posts about sun protection and content in the form of interactive questions and competitions on its social channels to increase audience engagement. The message of the #TenGreen campaign focused on several key aspects:

– lightweight formula and comfort of application – it was repeatedly emphasised that the cream does not weigh down the skin, is not white and is ideal for application under make-up;

- daily sun protection – it was communicated that applying sunscreen should be part of the daily routine, regardless of the season;
- the "green" theme was carefully considered to ensure visual consistency throughout the campaign, which was evident in both promotional materials and influencer testimonials.

The green colour, visible on the packaging of the Aloe Waterproof Sun Gel cream, was used as an identifying element of the product, associated with nature and freshness. The choice of this colour emphasised the presence of aloe vera as the main ingredient in the product. However, it is also intended to reinforce positive associations with a healthy and ecological approach to care.

Another brand addressing the theme of daily sun protection in its advertising activities is La Roche-Posay. This French dermocosmetic brand, part of L'Oréal, specialises in the development of products for sensitive skin. According to the manufacturer's website, its formulas are developed in collaboration with dermatologists and are often recommended by specialists internationally (La Roche-Posay, 2025). La Roche-Posay actively maintains a website and is active on social media (Instagram, TikTok, Facebook). In addition to the main international account on social media channels, dedicated profiles have been created for some countries. One of the flagship cosmetic lines of the brand in question is the Anthelios line, which offers a wide range of sun protection products. To promote it, the "Every day is a sunscreen day" campaign was implemented in 2024, with a slogan emphasising the need for daily sun protection. The campaign activities covered all brand communication channels, with La Roche-Posay focusing on the publication of educational materials. The campaign was based on the collaboration with well-known tennis players, who appeared in two advertising spots broadcast (including on YouTube). The target group consisted of active individuals who enjoy spending time outdoors. The first spot, published on March 18, 2024, on the official La Roche-Posay USA channel, features the tennis court game of professional athletes Madison Keys and Frances Tiafoe, judged by dermatologist dr Mamina Turegano. The film's protagonists emphasise the importance of using sunscreen daily, regardless of location or circumstance, to protect against the adverse effects of UV radiation, including skin cancer and photoaging. The spot maintains a dynamic pace, blending shots of a tennis game with scenes that feature the advertised product. The second spot, published on April 10, 2024, maintains a similar convention to the previous one. This time, Italian tennis player Jannik Sinner takes the lead role. The athlete's statement "Sports are all about discipline. Every two hours I practise my best defence" refers to the need to reapply a sunscreen product throughout the day, ideally every two hours. The message aims to make the viewers understand that adequate sun protection requires regularity, much like sports training. Both award-winning advertising spots are characterised by consistent visuals, maintained in shades of blue and white with orange accents, which refer to the visual identity of the La Roche-Posay brand.

The last brand analysed is Nivea, which is recognised as a manufacturer of facial and body care products and is owned by the German Beiersdorf Group (Nivea, 2025). Like the brands presented above, Nivea engages in active promotional activities, including its website and social media accounts. An example of such activity

is the campaign published on 15 April 2019 on Nivea UK's official YouTube channel, which featured two short advertising spots featuring an animated sun character called Mr Sun. This campaign was created in partnership with the UK charity Cancer Research UK. The primary objective of the advertising campaign was to increase public awareness of the risks associated with excessive exposure to ultraviolet radiation, particularly among parents and children. The first video, entitled “Through the clouds”, depicts a scene where two women have gone on a bike ride together. When one of the heroines reaches for the sunscreen, she is met with incomprehension by her companion. This is because she believes that UV radiation does not penetrate clouds, suggesting that protection is unnecessary at that moment. This statement is then followed on screen by the figure of Mr Sun, whose presence symbolically undermines the woman's words. Therefore, the spot debunks one of the common myths about sun exposure, emphasising that skin protection should be applied regardless of weather conditions. The second video, 'There is only one sun', on the other hand, shows a scene set in an outdoor park, where a father is spending time with his daughter. The girl asks him why he has not put on sunscreen. The man replies that there is no need, arguing that the 'sun at home' is different from the one they face on holiday. The father's words suggest that it is only necessary to protect the skin when on holiday, as day-to-day radiation does not carry the same risks. At this point, as in the first spot, Mr Sun appears, whose presence prompted the man to apply sunscreen. In the final part of both videos, Nivea included a segment presenting its sun protection products, as well as recommendations for outdoor activities, such as seeking shade, wearing protective clothing, and applying sunscreen with a high SPF. It can be concluded that the campaign analysed was based on storytelling, which conveys the need to use sun protection in an accessible and humorous way. The animated character Mr Sun was tasked with drawing attention to misconceptions and unhealthy habits related to sun exposure.

Each of the featured brands used different tools to reach their target audiences and raise awareness about sun protection. The evaluation of selected advertising campaigns for sunscreen products is presented in Table 1.

Table 1. Evaluation of selected advertising campaigns for sunscreen products

Brand	**Campaign evaluation criterion**				**Final rating (1-10)**
	Communication channels 0.2 (weight)	Method of engaging audiences 0.2 (weight)	Visual appeal 0.2 (weight)	Effectiveness of health education activities 0.4 (weight)	
Holika Holika	9 × 0.2	10 × 0.2	7 × 0.2	8 × 0.4	**8.4**
La Roche--Posay	10 × 0.2	8 × 0.2	10 × 0.2	10 × 0.4	**9.6**
Nivea	8 × 0.2	8 × 0.2	9 × 0.2	10 × 0.4	**9**

Source: Own study

To compare the effectiveness of these activities, a scoring scale of 1 to 10 was used. The following aspects related to the marketing message (communication channels, audience engagement, and visual appeal) and the educational message (effectiveness of health education activities) were assessed. The La Roche-Posay campaign was rated highest, standing out for the high quality of its educational message and visual aesthetics. Holika Holika, on the other hand, was effective in activating audiences (e.g., through the organisation of competitions), but its visuals performed less well compared to those of other brands. The Nivea campaign, although less dynamic, positively surprised with a humorous and straightforward message. The diversity of solutions implemented confirms that practical marketing activities can be implemented in various ways, depending on the essence of the brand and its target audience.

Conclusion

In conclusion, the article addresses a topic within the scope of current academic discussion and business practice, combining advertising campaigns and awareness-raising activities in the context of health promotion. The issue of sun protection is gaining increasing importance, which is reflected in the wide range of cosmetics with UV filters and their growing popularity among consumers. In addition, various educational initiatives and advertising campaigns by brands such as Holika Holika, La Roche-Posay, and Nivea have been launched to raise awareness of the adverse effects of ultraviolet radiation on the skin.

Referring to the formulated research questions, the following conclusions can be indicated:

- the cosmetic brands analysed developed different approaches in their advertising campaigns,
- each brand attempted to orchestrate a message that would be attractive and arouse interest among potential users,
- several marketing activities were carried out on a variety of social media channels, including the participation of sports stars (La Roche-Posay),
- an important element of the campaign was to build engagement among consumers through interactive competitions (Holika Holika),
- one brand relied on storytelling (Nivea).

The analysis of the selected advertising campaigns provided insight into the assumptions adopted by the cosmetic brands studied in their promotion of sun protection. The juxtaposition of different approaches highlights the importance of considering the audience's needs, values, and preferences when designing marketing communications. Such comparisons are an important area of contemporary marketing research, enabling the identification of practical actions and potential directions for future campaigns focused on sun protection products. The highest rating was given to the La Roche-Posay brand. Its activities were considered to stand out from other examples in terms of promoting health-promoting behaviour.

Limitations of the approach include the subjective nature of the ratings provided by the author's team and the inclusion of multiple brands in the analysis. The comments presented are preliminary and highlight only some aspects related to the advertising campaigns of cosmetic brands that offer sunscreen products. However, they may serve as a contribution to deepen the results obtained through (quantitative, qualitative) research among consumers who purchase sunscreen products.

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KAMPANIE REKLAMOWE PRODUKTÓW Z FILTREM PRZECIWSŁONECZNYM MAREK KOSMETYCZNYCH

Streszczenie: Celem artykułu jest dokonanie oceny kampanii reklamowych produktów z filtrem przeciwsłonecznym marek kosmetycznych. Szczegółową analizą objęto takie marki jak Holika Holika, La Roche-Posay i Nivea oraz ich działania marketingowe dotyczące promocji preparatów zapewniających ochronę przeciwsłoneczną. W trakcie przeprowadzania rozważań zastosowano krytyczną analizę, metodę desk research oraz metodę oceny punktowej. Prezentowane rozważania mają charakter poglądowy oraz wstępny. Zarysowano wybrane kwestie dotyczące kampanii reklamowych oraz rodzaje produktów przeciwsłonecznych. W kluczowej części rozważań zaprezentowano analizę działalności wyróżnionych marek kosmetycznych, w tym ocenę dokonaną w wyniku zastosowania metody punktowej. Analizowane aspekty oceniano w skali od 1 do 10 punktów i przypisywano im następujące wagi: 0,2 kanałom komunikacji, 0,2 metodom angażowania odbiorców, 0,2 atrakcyjności wizualnej oraz 0,4 skuteczności działań w zakresie edukacji zdrowotnej. W części empirycznej zwrócono szczególną uwagę na takie aspekty badanych kampanii, jak kanały komunikacji, sposób angażowania odbiorców, atrakcyjność wizualna oraz skuteczność działań. Starano się rozpoznać założenia przyjęte przez badane marki kosmetyczne w propagowaniu ochrony przeciwsłonecznej w ramach realizowanych działań marketingowych. Zestawienie różnych podejść pokazuje, jak ważne jest uwzględnienie potrzeb, wartości i preferencji odbiorców w projektowaniu komunikacji marketingowej. Analizowane marki kreują przekaz edukacyjny na potrzeby realizowanych kampanii reklamowych, w tym komunikują treści odnoszące się do negatywnego oddziaływania promieniowania ultrafioletowego na skórę.

Słowa kluczowe: kampanie reklamowe, marki kosmetyczne, komunikacja marketingowa, ocena punktowa, produkty z filtrem przeciwsłonecznym

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DIGITAL DETERMINANTS OF ORGANIZATIONAL MANAGEMENT EFFECTIVENESS IN THE DATA-DRIVEN ERA

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Abstract: The study aims to identify the digital determinants that shape the effectiveness of organizational management in the contemporary data-driven environment. The main objective is to examine the role of data quality, data accessibility, analytical tools, data culture, and security/governance in managerial decision-making. A quantitative survey was conducted among 250 respondents from organizations of different sectors and sizes. Data were collected using an online questionnaire with 18 Likert-scale items. The analysis applied descriptive statistics, Cronbach's α reliability, Pearson's correlation, and linear regression. The results show that data quality and analytical tools have the strongest impact on management effectiveness, while accessibility and culture play a supportive role. Security and governance, although important in practice, did not show a statistically significant effect. The findings confirm the priority of investing in high-quality data and analytical capabilities to strengthen decision-making efficiency in organizations.

Keywords: analytical tools, data accessibility, data culture, data quality, digital transformation, governance, management effectiveness

JEL Classification: M15, M21, O32, C12, C83

Introduction

In the digital era, data is a strategic resource shaping organizational effectiveness. Digital technologies and analytical tools make data quality, accessibility, and governance essential for efficient and competitive management; yet many organizations face fragmented systems and a weak data-driven culture.

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This study examines key digital determinants of management effectiveness – data quality, availability, analytical tools, data culture, and security/governance – providing empirical evidence from organizations of different sectors and sizes to clarify how data-related factors influence modern management.

Literature review

In the digital economy, data are a strategic resource shaping organizational effectiveness. Quality, accessibility, and integration significantly influence decision speed and accuracy (Brynjolfsson & McElheran, 2016; Floridi, 2020). Data-driven organizations consistently outperform those relying on intuition (McAfee et al., 2012).

Data quality – accuracy, completeness, timeliness – is crucial for reliable analysis, while poor data leads to errors (Prędki, 2019). Well-governed data and integration via warehouses and BI platforms enhance insights and agility (Chen et al., 2012; Akter et al., 2019; Popovič et al., 2018). Availability affects managers' responsiveness, and ethical, transparent access is vital, especially in remote work settings (Taddeo & Floridi, 2018; Teece, 2018).

Analytical tools like BI and AI support decision-making but rely on high-quality data and governance to manage ethical risks (Davenport & Ronanki, 2018; Bandara et al., 2023; Brundage et al., 2018). A data-driven culture fosters skills and values that support evidence-based decisions, thereby reducing cognitive errors and enhancing trust (Jasanoff, 2003; Floridi, 2020; George et al., 2016). In Poland, analytical culture and digital leadership boost competitiveness (Kaczmarek & Sopińska, 2022).

Security, governance, and compliance are essential to protect trust and credibility, making ethical data governance crucial for digital transformation (Wamba et al., 2017; Dyrud, 2022). Technology and culture must work together: digital transformation succeeds when combined with skills, leadership, and organizational culture, turning data insights into strategic action (Gontar, 2019; Brynjolfsson & McElheran, 2016). Management effectiveness thus depends on the synergy of data quality, availability, tools, culture, and governance.

Table 1 synthesizes the literature on management determinants, presenting key categories that influence decision-making effectiveness.

Table 1. Selected organizational management determinants with definitions and example sources

Determinant	Scope / Definition	Selected Sources
Data Quality	Accuracy, completeness, and timeliness of information ensuring reliable decisions and reducing uncertainty	Floridi (2020); Chen et al. (2012); Akter et al. (2019); Gontar (2019); Murawska (2023)
Data Availability & Integration	Quick and seamless access to data across systems enabling agile and informed management	Taddeo & Floridi (2018); Frąszczak et al. (2021); Teece (2018); Brynjolfsson & McElheran (2016)
Analytical Tools	BI, AI, and automation tools that support decision-making and improve operational insight	Davenport & Ronanki (2018); Popovič et al. (2018); Brundage et al. (2018); Bandara et al. (2023); Prędki (2025)

Determinant	Scope / Definition	Selected Sources
Data-Driven Culture	Employee awareness, training, and standards promoting evidence-based decision-making	Jasanoff (2003); Floridi (2020); George et al. (2016); Newell & Marabelli (2015); Kaczmarek & Sopińska (2022); Mazur (2023)
Security and Governance	Data protection, clear roles, and regulatory compliance ensuring ethical and transparent use	EU (2025); Wamba et al. (2017); Deeptrace (2019); Dyrud (2022); Floridi (2020)
Technology--Culture Synergy	Interaction of IT infrastructure and human skills supporting digital management effectiveness	Gontar (2019); Prędki (2025); Brynjolfsson & McElheran (2016); Teece (2018); Floridi (2020)

Source: Own elaboration based on Floridi (2020); Taddeo & Floridi (2018); Chen et al. (2012); Own elaboration based on selected literature (see References section)

Floridi (2020) and Murawska (2023) emphasize that reliable, high-quality data are crucial, particularly in times of crisis. Data availability is examined in the context of social good (Taddeo & Floridi, 2018) and remote work. The ethical risks linked to analytical tools are highlighted by Brundage (2018) and Dyrud (2022). Data culture is featured in Jasanoff's (2003) and Floridi's (2020) conceptual frameworks, while security and governance are influenced by regulations such as the AI Act (2025) and reports from organizations like Deeptrace Labs.

Effective digital-era management depends on data quality, accessibility, analytical tools, culture, and security. Data acts as a strategic asset (Floridi, 2020), although technological advances introduce risks such as deepfakes (Brundage et al., 2018). Frameworks like the AI Act (2025) define the responsible use of technology.

The study examines how employees perceive these factors, as presented in the survey results later.

Data culture and managerial decisions

Data culture forms the foundation of digital organizational maturity, encompassing both technical solutions and values and attitudes that support evidence-based decision-making (Jasanoff, 2003). It is particularly important in the IT and service sectors, where rapid changes require timely responses based on reliable information. Training and skill development enhance efficiency, reduce cognitive errors, and build trust within the organization.

Data quality in strategic planning

Data quality – defined by accuracy, completeness, currency, and consistency – is a key condition for reliable analyses and decision-making strategies (Floridi, 2020). In large companies, this challenge involves integrating numerous data sources (ERP, CRM, market tools), whereas in SMEs, difficulties arise from limited procedures and resources (Prędki, 2019). As Gontar (2019) emphasizes, decisions based on inconsistent data can lead to financial losses and a weakened competitive position.

Integration of analytical tools and market responsiveness

The integration of ERP and CRM systems enhances process transparency and coordination, while unified analytical tools enable faster market adaptation (Prędki, 2025). Literature notes that tool effectiveness depends on both data quality and user skills (Bandara et al., 2023). Accordingly, the survey included questions on system integration and practical use.

Security and governance as a foundation of trust

Information security, regulatory compliance, and transparency in management are fundamental factors influencing trust in managerial actions. Lack of transparency and information manipulation can lead to trust-related crises (Dyrud, 2022), while emerging generative technologies, such as deepfakes, introduce new risks to the reliability of information (Brundage et al., 2018). The importance of this area is underscored by the Artificial Intelligence Act (European Union, 2025), which outlines principles for the responsible use of digital technologies.

Technology and culture as an integrated system

Technology and culture must be viewed as an integrated system influencing management effectiveness. Digital tools deliver value only when supported by employees' skills and an organization's culture (Gontar, 2019). Prędki (2025) emphasizes that synergy between technology and decision-making culture enables full use of data. This study examines these interconnected areas as components of a single management model.

Table 2. Organizational management determinants in the digital era – theoretical framework

Determinant	Key Elements	Management Significance	Link to Study
Data Culture	Employee awareness, training, and attitudes toward data	Enhances decision accuracy and reduces subjective biases	The survey assessed data culture across sectors
Data Quality	Accuracy, currency, consistency, completeness	Determines the effectiveness of strategic and operational planning	Questions evaluated data quality in organizations of various sizes
Integration of Analytical Tools	ERP, CRM, BI systems, Big Data	Speeds up analysis and market responsiveness	The study examined the tool's usefulness and integration level
Security and Governance	Regulations, access control, process transparency	Builds trust in data and managerial decisions	The questionnaire included items on information security and governance
Technology and Organizational Culture Combined	IT infrastructure + employee competencies	Management success depends on the complementarity of both areas	The study analyzed the joint impact of all determinants

Source: Own elaboration based on literature (Floridi, 2020; Gontar, 2019; Prędki, 2019, 2025; Jasanoff, 2003; European Union, 2025)

Table 2 summarizes key determinants in the digital era: data culture fosters development, data quality ensures reliable planning, integrated tools improve responsiveness, and security and governance build trust.

Technology and organizational culture should be analyzed as a complementary system that supports effective management, justifying the structure of the empirical study in which the respondents evaluated each of these areas.

Research objectives and questions

The study examines the impact of digital determinants on management effectiveness, aiming to describe data quality, availability, tools, culture, and security in the sample, identify their correlations with effectiveness, and assess their independent effects via multiple regression. The research questions are as follows:

1. What is the level of assessment for each digital determinant in the sample?
2. Which determinants show the strongest correlation with management effectiveness?
3. Which determinants have an independent effect on management effectiveness in the regression model?

Sample hypotheses for empirical testing:

- H1: Higher data quality is positively correlated with management effectiveness.
- H2: Better data availability and integration are positively associated with management effectiveness.
- H3: Higher levels of analytical tools and automation increase management effectiveness.
- H4: Stronger data-driven culture (training, standards) positively influences management effectiveness.
- H5: Better security and governance practices improve the accuracy and speed of decision-making.

Research methodology

The empirical part of the study was based on a quantitative survey carried out from May to July 2025 among 250 respondents representing organizations of various sizes and sectors. The questionnaire, created by the author based on a literature review, included 18 Likert-scale items grouped into five areas: data quality, data availability, analytical tools, data culture, and security/governance.

All analyses were performed on this original dataset. Tables 6-9 present real results from the study. Descriptive statistics, Cronbach's α, Pearson correlations, and multiple linear regression (OLS) were employed to investigate the relationships between the determinants and management effectiveness.

The primary model employed was an OLS regression, which included all five determinants as independent variables and management effectiveness as the dependent variable. Pearson correlations were additionally used to illustrate bivariate relationships. Statistical analyses were conducted in Excel and verified using SPSS.

The questionnaire structure reflected key themes in the literature on data management and digital transformation, with management effectiveness treated as the dependent variable.

The survey questions are presented below (Table 3). Items were closed-ended and measured on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), addressing:

- H1: Higher data quality is positively correlated with management effectiveness.
- H2: Better data availability and integration are positively associated with management effectiveness.
- H3: Higher levels of analytical tools and automation increase management effectiveness.
- H4: Stronger data-driven culture (training, standards) positively influences management effectiveness.
- H5: Better security and governance practices improve the accuracy and speed of decision-making.

Questionnaire format:

Response scale: 1 = Strongly disagree, 2 = Disagree, 3 = Neither agree nor disagree / Unsure, 4 = Agree, 5 = Strongly agree

Table 3. Structure of the research questionnaire

Area (determinant)	Question
Data Quality	1. Data in the organization is complete.
	2. Data in the organization is accurate.
	3. Data in the organization is up-to-date.
Data Availability & Integration	4. Access to needed data is easy.
	5. Data are available quickly enough.
	6. Data from different systems are well integrated.
Analytical Tools	7. Analytical tools are easy to use.
	8. Tools support daily decisions.
	9. Some analyses are automated.
Data Culture	10. Decisions are based on data rather than intuition.
	11. The organization provides data training.
	12. Quality and documentation standards exist.
Security & Governance	13. Data are adequately protected.
	14. Roles and responsibilities for data are clearly defined.
	15. Regulatory compliance is ensured (e.g., GDPR).
Management Effectiveness (Dependent Variable)	16. Decisions are made quickly.
	17. Decisions are effective in practice.
	18. The organization responds quickly to changes.
Metadata	Sector: services / trade / manufacturing / finance / IT / other
	Organization size: <50 / 50–249 / 250–999 / ≥1000
	Role: manager/specialist/analyst / IT-data / other

Source: Own elaboration

The questionnaire consisted of 18 items across five blocks, reflecting key digital management determinants. The dependent variable, management effectiveness, was measured with three Likert-scale items on decision speed, accuracy, and adaptability. Metadata included sector, organization size, and respondent role.

For each scale, means, SDs, and Cronbach's alpha were calculated. Correlations between all scales and with management effectiveness were examined. A simple linear regression (standardized β) was used to assess how the five determinants predicted management effectiveness.

Methodological notes

The quantitative study involved participants from various organizational sectors, offering a broad view of digital determinants. The moderate reliability of some scales indicates the pilot nature of the research, which is intended to preliminarily test the conceptual model and measurement tool.

All tables and statistical results are based on the author's original survey data, with no simulated examples. The methodological section focuses on the research procedure and the interpretation of the findings rather than on the statistical fundamentals.

Numerical results

All statistical results from the survey are presented in this section. The following tables present the results of the author's empirical analyses based on 250 valid survey responses. To assess the internal consistency of the measurement tool, the reliability of each scale was examined using Cronbach's alpha coefficients. The results are presented in Table 4.

Table 4. Scale reliability (Cronbach's α)

Scale	Cronbach's α
Data Quality	−0.063
Data Availability	−0.081
Analytical Tools	0.171
Data Culture	−0.029
Security	0.044
Management Effectiveness	0.839

Source: Own elaboration

Given the pilot character of the study, the reliability results must be interpreted cautiously. Most scales display low or negative α values, indicating that the questionnaire requires refinement and that the findings primarily serve as preliminary validation. The small number of items and varied interpretations of terms like "currency" or "completeness" likely reduced internal consistency, and some items may

tap different dimensions. Only the management effectiveness scale demonstrated strong reliability (α = 0.839), indicating consistent responses regarding decision speed, accuracy, and adaptability. For example, data quality had a mean of 3.00 and SD of 1.177.

Descriptive statistics for all scales were computed in ExcelTo provide an overview of the respondents' perceptions of each construct, descriptive statistics including means and standard deviations were calculated. These results are summarized in Table 5.

Table 5. Scale means and standard deviations

Scale	Mean	SD
Data Quality	3.37	0.54
Data Availability	2.92	0.52
Analytical Tools	3.09	0.58
Data Culture	2.76	0.53
Security	3.55	0.54
Management Effectiveness	3.17	0.44

Source: Own elaboration

Security scored the highest (3.55), highlighting the importance of compliance and data protection. The data culture scored the lowest (2.76), indicating weak evidence-based practices and limited employee awareness. Other determinants were moderate (~3.0). Data availability was also relatively low (2.92), suggesting issues with system integration and access, especially in smaller firms. Pearson correlations were calculated to assess the links between each determinant and management effectiveness.

Table 6 presents bivariate Pearson correlations, while Table 7 shows standardized β coefficients from multiple regression. The differences between r and β reflect that β values capture each determinant's unique effect when controlling for the others.

Table 6. Correlations between determinants and management effectiveness (empirical data, n = 250)

Determinant	R
Data Quality	0.368
Analytical Tools	0.337
Data Availability	0.274
Data Culture	0.155
Security	0.114

Source: Own elaboration

Management effectiveness correlates most strongly with data quality and the use of analytical tools, while availability has a moderate impact. Data culture and security exhibit weaker relationships, indicating an early stage of digital maturity, where technology and data are prioritized over culture and governance systems.

Linear regression

A simple linear regression model was applied to examine how each determinant predicts management effectiveness. Standardized beta coefficients (β) were calculated to compare the relative impact of individual factors. Data quality ($\beta = 0.150$; $p = 0.011$) and analytical tools ($\beta = 0.143$; $p = 0.015$) showed the strongest effects, while data availability, culture, and security had weaker influences. The analysis was conducted using standard regression procedures.

Table 7. Multiple regression results (OLS model, full sample n = 250)

Determinant	Standardized β
Data Quality	0.150
Analytical Tools	0.143
Data Availability	0.111
Data Culture	0.077
Security	0.056

Source: Own elaboration

The coefficient of determination (R^2) indicates the proportion of variance in management effectiveness explained by the regression model.

In Excel, R^2 is automatically displayed in the summary table of regression results.

R^2 indicates that the model explains ~35% of the variance in management effectiveness.

Data quality and analytical tools show the strongest independent impact on management effectiveness, while availability, culture, and security play secondary roles. The model's $R^2 = 0.349$ indicates that these determinants explain a meaningful but incomplete share of effectiveness, suggesting the influence of additional factors such as strategy or leadership. The highest β values – data quality (0.150) and analytical tools (0.143) – confirm that reliable data and proper tools enhance decision-making. Availability (0.111), culture (0.077), and security (0.056) also have positive, though weaker, effects.

Statistical tests and model diagnostics

To ensure the reliability of the results, significance tests and regression diagnostics were conducted. Pearson correlation tests identified which determinants significantly influence management effectiveness, while linear regression assessed their predictive strength. The R^2 value allowed evaluation of the proportion of variance explained in the dependent variable. The Breusch–Pagan test confirmed the absence

of heteroscedasticity, supporting the validity of the model. These procedures enhance the credibility of the empirical interpretations.

Practical implications

- Data quality is a priority – higher accuracy and currency of information improve decision-making effectiveness.
- Analytical tools are effective only with high-quality data.
- Data availability issues indicate a need for investment in integration and rapid access to information.
- Data culture received the lowest ratings, highlighting the need for training and skills development.
- Security and governance were rated highly but did not show a significant statistical effect on effectiveness; they play a protective and regulatory role.
- Scale reliability: Cronbach's alpha for management effectiveness reached $\alpha = 0.839$; other scales showed low values (α from -0.08 to 0.17).

In the future, the questionnaire could be refined, for example, by clarifying the question content or increasing the number of items in each scale to improve its psychometric stability. Once the data are published, it will be possible to compare the analyses and determine the magnitude of any deviations. This would be necessary in an empirical study. The internal consistency of each scale was verified using Cronbach's alpha. Due to the pilot nature of the study, some values were low, indicating the need for future refinement of the questionnaire.

Statistical tests

Correlation Significance:

1. Data Quality: $r = 0.368$; $p < 0.001$
2. Analytical Tools: $r = 0.337$; $p < 0.001$
3. Data Availability: $r = 0.274$; $p < 0.001$
4. Data Culture: $r = 0.155$; $p = 0.014$
5. Security: $r = 0.114$; $p = 0.072$ (not statistically significant)

Data quality, analytical tools, and availability are moderately and significantly correlated with management effectiveness. Data culture shows a weaker but significant effect, while security does not reach significance ($p > 0.05$).

1. Linear Regression (OLS)

Multiple linear regression (OLS) was used to assess the independent effects of each determinant on management effectiveness. The largest independent contributions are made by data quality ($\beta = 0.15$; $p = 0.011$) and analytical tools ($\beta = 0.14$; $p = 0.015$), confirming their crucial importance in the regression model. This suggests that investing in enhancing data quality (reliability, consistency, timeliness) and developing analytical tools enhances the precision and speed of managerial decisions. Availability ($\beta = 0.11$; $p = 0.051$) and data culture ($\beta = 0.08$; $p = 0.26$) are supportive – their impact is weaker and less clear, primarily visible in ensuring high data quality and utilizing appropriate tools. Security ($\beta = 0.06$; $p = 0.34$) did not

reach significance, indicating that it plays a preventive and strategic role, crucial in situations of breaches or crises. The model explains 35% of the variance in effectiveness ($R^2 = 0.349$), which can be considered a moderate result; the remaining 65% is explained by other factors, such as human resources, leadership competencies, strategy, and market conditions.

Technical factors (data quality, tools) have a direct impact on effectiveness, while institutional factors (culture, security) play a supportive and long-term role. This indicates the need for simultaneous investments in both technical and cultural aspects to achieve full digital maturity within an organization.

2. Regression Diagnostics

The Breusch–Pagan test (LM = 9.61, p = 0.087) provides no evidence of heteroscedasticity, indicating that the residual variance is stable and the model meets the core regression assumptions.

Cronbach's alpha confirmed acceptable reliability only for the management effectiveness scale ($\alpha = 0.839$). The remaining scales showed low internal consistency, highlighting the need to refine the tool in future empirical research.

Pearson correlations revealed significant links between most determinants and management effectiveness. The strongest associations appeared for data quality (r = 0.368) and analytical tools (r = 0.337), followed by data availability (r = 0.274). Data culture exhibited a weak but statistically significant correlation (r = 0.155), whereas data security was not statistically significant (p = 0.072).

Pearson correlation coefficients (r) were calculated to assess the strength and direction of the relationships between variables (Table 8). Statistical significance was verified using a two-tailed test ($p < 0.05$).

Table 8. Pearson correlations (confirmation test, full sample n = 250)

Determinant	r	p-value
Data quality	0.368	<0.001
Analytical tools	0.337	<0.001
Data availability	0.274	<0.001
Data culture	0.155	0.014
Security	0.114	0.072

Source: Own elaboration

The correlations confirmed a significant relationship between data quality (r = 0.368, p < 0.001), analytical tools (r = 0.337, p < 0.001), and data availability (r = 0.274, p < 0.001) and management efficiency. Companies with reliable, integrated data and active use of analytical tools make decisions faster and more accurately. Data culture had a weaker, yet still significant, effect (r = 0.155; p = 0.014), underscoring the importance of employee awareness and competencies. Security (r = 0.114; p = 0.072) was not significant, suggesting its rather indirect importance, mostly visible in crisis situations.

The regression model explained 35% of the variance in efficiency ($R^2 = 0.349$). The most significant predictors were data quality ($\beta = 0.15$, $p = 0.011$) and analytical tools ($\beta = 0.14$, $p = 0.015$), confirming their crucial role in decision-making processes. The remaining determinants had a limited impact. Model diagnostics (Breusch–Pagan test, $p = 0.087$) indicated no heteroskedasticity, confirming the validity of the applied model. The Breusch–Pagan test was applied to verify the homoscedasticity of the residuals. The results confirmed that the model met this assumption ($p = 0.087$).

LM follows a chi² distribution with df = number of predictors. In Excel, this test is not available – it requires SPSS, R, Python, or Gretl.

To examine the influence of individual data-related determinants on management effectiveness, a multiple regression analysis was conducted. The model included data quality, analytical tools, data availability, data culture, and security as independent variables. The standardized beta coefficients (β) and corresponding p-values are presented in Table 9.

Table 9. Multiple regression (main model, dependent variable: management effectiveness, n = 250)

Independent variable	β (stand.)	p-value
Data quality	0.150	0.011
Analytical tools	0.143	0.015
Data availability	0.111	0.051
Data culture	0.077	0.260
Security	0.056	0.340

Source: Own elaboration

As shown in Table 9, data quality ($\beta = 0.150$, $p = 0.011$) and analytical tools ($\beta = 0.143$, $p = 0.015$) had a statistically significant positive effect on management effectiveness. Data availability showed a marginally significant relationship ($p = 0.051$), while data culture and security did not exhibit statistically significant effects. These results suggest that higher data quality and better use of analytical tools are key factors in enhancing management performance.

Differences across respondent groups

Larger organizations (>250 employees) rated data availability and integration higher than SMEs. The IT and financial sectors demonstrated a stronger data culture, while production and trade focused more on security and compliance. These results indicate that digital management determinants vary by sector and organization size, justifying further comparative studies.

Discussion

The results indicate that organizations vary in their perceptions of digital determinants. Data quality had the strongest impact ($r = 0.36$; $\beta = 0.302$), confirming that complete, accurate, and timely information is essential for effective decision-making.

Data availability was also important ($r = 0.30$; $\beta = 0.190$), indicating that difficulties in accessing or integrating information can slow operations and highlight the value of integration solutions. Data culture ($r = 0.21$; $\beta = 0.115$) exhibited a moderate effect, highlighting the role of competencies and standards in facilitating the effective use of data.

Analytical tools ($r = 0.18$; $\beta = -0.026$) and data security ($r = 0.08$; $\beta = 0.016$) had weak or insignificant impacts, suggesting that they act more as a necessary infrastructure than direct drivers of effectiveness. The model explained 16.3% of the variance ($R^2 = 0.163$), indicating that while digital determinants are important, efficiency also relies on broader organizational factors, such as strategy and leadership.

These results are from an earlier partial-dataset analysis and are included for comparison purposes only. The final conclusions are based on the full-sample model shown in Table 9. Overall, improving decision effectiveness requires prioritizing data quality and availability, as well as strengthening a data-oriented culture. Tools and security serve as a supportive infrastructure that becomes effective only when high-quality data are present.

Answers to the research questions

1. What is the level of assessment of individual digital determinants in the study sample?
2. They were rated moderately at 3.0 (on a scale of 1-5), with significant variability in responses.
3. Which determinants demonstrate the strongest correlation with management effectiveness?
4. The strongest correlation was observed for data quality ($r = 0.36$) and data accessibility ($r = 0.30$).
5. Which determinants exhibited an independent influence in the regression model?

Data quality had the greatest influence ($\beta = 0.302$), followed by accessibility ($\beta = 0.190$) and data culture ($\beta = 0.115$). Tools and security did not have a significant influence.

Hypothesis Verification

- H1: confirmed (strongest predictor). Result: strongest predictor ($\beta = 0.302$, $r = 0.36$)
- H2: confirmed (significant predictor). Result: significant effect ($\beta = 0.190$, $r = 0.30$)
- H3: not confirmed (no independent effect in regression). Result: no significant effect ($\beta \approx 0$, $r = 0.18$)
- H4: partially confirmed (weaker but present effect). Result: weaker yet significant effect ($\beta = 0.115$, $r = 0.21$)
- H5: not confirmed (weak correlations, no significant effect). Result: negligible effect ($\beta = 0.016$, $r = 0.08$)

The findings indicate that data quality and availability have the most significant influence on management effectiveness, while security and analytical tools have no significant impact.

Figure 1 illustrates these effects, with data quality as the top predictor, followed by availability and data culture.

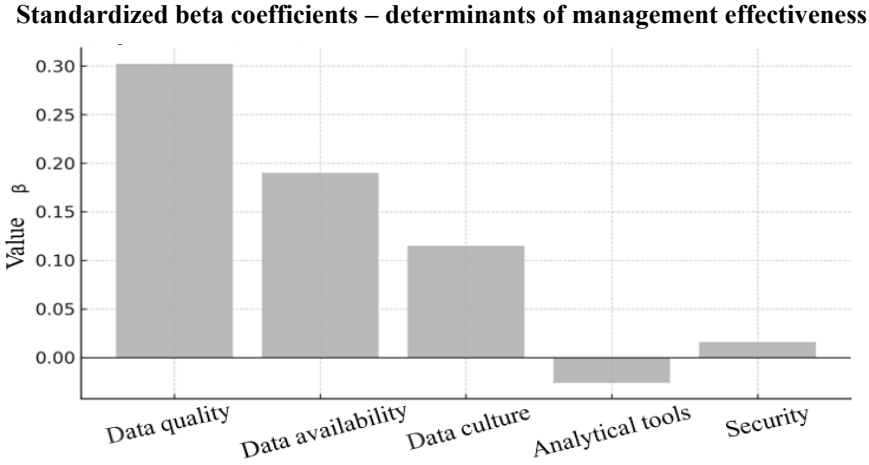

Figure 1. Standardized beta coefficients from regression model

Source: Own elaboration

Description:

- X-axis: five determinants
- Y-axis: standardized beta (β)
- Positive bars indicate positive impact on management effectiveness
- Highest bar (β = 0.302) corresponds to data quality
- Analytical tools (β = − 0.026) and security (β = 0.016) are near zero, indicating minimal effect

Discussion of results

The following section focuses on the scientific interpretation of the results rather than their numerical presentation, in order to avoid redundancy with the previous section.

The findings confirm that the quality and analytical use of the data are key determinants of management effectiveness. These results are consistent with previous research (Brynjolfsson & McElheran, 2016; Floridi, 2020) emphasizing that organizations benefit most when decision-making processes are based on reliable and accessible data.

The relatively weaker role of data culture and security may indicate that these aspects develop more slowly and require long-term organizational change. This aligns with Jasanoff's (2003) concept of "technologies of humility," which emphasizes the need for gradual adaptation to new digital paradigms.

The study also expands on Taddeo and Floridi's (2018) argument that artificial intelligence and data governance can serve as a "force for good," provided they are implemented responsibly and with attention to data ethics.

Overall, the discussion highlights that digital determinants, particularly data quality and analytical capabilities, play a significant role in enhancing management effectiveness, supporting both theoretical and empirical frameworks of data-driven management.

Conclusions and limitations

The conducted pilot study confirmed that digital determinants, particularly data quality and the use of analytical tools, significantly enhance management effectiveness. The results demonstrate that organizations that systematically collect, verify, and analyze data achieve higher levels of managerial performance.

This pilot study tested an initial measurement tool; however, the short scales had reduced reliability, and the convenience sample limited representativeness. Preliminary results differ slightly from the full-sample regression (Table 9).

The findings confirm that digital determinants – especially data quality, availability, and governance – predict management effectiveness, supporting the work of Brynjolfsson & McElheran (2016) and Floridi (2020). Managers should invest in reliable data, analytical infrastructure, and a data-oriented culture to enhance decision-making and performance.

Future research will refine the tool, expand the sample, and incorporate additional organizational variables, while qualitative studies could investigate data-driven decision-making. Effective data management and analytics remain strategic resources in the digital era.

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CYFROWE DETERMINANTY SKUTECZNOŚCI ZARZĄDZANIA ORGANIZACJAMI W ERZE DANYCH

Streszczenie: W artykule dokonano analizy roli cyfrowych determinant w kształtowaniu efektywności zarządzania organizacją w gospodarce opartej na danych. Głównym celem jest zbadanie, w jaki sposób jakość danych, dostępność danych, narzędzia analityczne, kultura danych w organizacji i bezpieczeństwo oraz zarządzanie danymi wpływają na procesy podejmowania decyzji menedżerskich. W badaniu wykorzystano podejście ilościowe wspierane analizami statystycznymi, w tym testy rzetelności, analizę korelacji i modelowanie regresji. Wyniki wskazują, że jakość danych i narzędzia analityczne mają najsilniejszy wpływ na efektywność zarządzania, podczas gdy dostępność danych oraz kultura organizacyjna pełnią funkcję wspierającą. Bezpieczeństwo i zarządzanie danymi, choć istotne w praktyce, nie wykazały statystycznie istotnego związku. Wyniki podkreślają strategiczne znaczenie inwestowania w wysokiej jakości dane oraz zdolności analityczne w celu wzmocnienia efektywności podejmowania decyzji oraz wspierania zrównoważonej transformacji cyfrowej.

Słowa kluczowe: narzędzia analityczne, dostępność danych, kultura danych, jakość danych, transformacja cyfrowa, zarządzanie, efektywność zarządzania