

Special Issue Reprint

Emerging Trends in Innovative Learning Environments and Entrepreneurial Learning

Edited by
Muhammad Zaheer Asghar and Samma Faiz Rasool

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Sustainable Inclusion: Emerging Technologies, Innovative Learning Environments, and Entrepreneurial Learning in the Context of Individual and Societal Variability

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The world is transforming at an unprecedented pace. Technological advancements, increasing global connections, and a clearer understanding of diverse learner needs are rapidly reshaping both education and the workplace. This dynamic environment necessitates a fundamental re-evaluation of teaching and learning. Traditional, uniform models, often designed for a more homogenous learner population and stable professional landscape, are demonstrably less effective in preparing individuals for the intricate challenges of today and tomorrow. Instead, a flexible and responsive educational approach is urgently needed. This new paradigm must foster creativity, critical thinking, problem-solving, adaptability, and resilience, cultivating a robust entrepreneurial mindset. Crucially, it must ensure accessible and effective learning for everyone, supporting long-term inclusion and equal opportunities across all societal strata.

1. Individual and Societal Variability: A Central Challenge in Entrepreneurial Learning

Our pursuit of sustainable and inclusive development is essential amidst pervasive global challenges like climate change, rapid technological change, and persistent social inequality. Addressing these complex issues demands innovative solutions and adaptable mindsets, compelling us to re-examine approaches to learning, innovation, and empowering future change-makers through entrepreneurial learning.

Historically, education systems, encompassing both formal settings like universities and non-formal environments such as work-life learning and organizational training initiatives, have favored standardized approaches, primarily for administrative convenience (Zhao et al., 2023). However, these models frequently fail to account for the wide spectrum of individual and societal variability, encompassing diverse cognitive styles, socio-emotional needs, cultural backgrounds, learning speeds, and broader demographic and socio-economic shifts. This oversight has unfortunately marginalized many learners. While entrepreneurial thinking—identifying opportunities, fostering creativity, and maintaining resilience (Duchek, 2018)—is a vital life skill for all, its cultivation is not limited to formal educational setups like schools or universities; rather, entrepreneurial learning spans diverse environments, including non-formal settings such as the workplace and other organizational learning initiatives (Wang & Chugh, 2014). Therefore, instilling this mindset in a manner that respects these individual and societal differences and creates multiple, valid pathways to success remains a critical task. This challenge is amplified by a fragmented understanding of precisely how emerging technologies, innovative learning

environments, and entrepreneurial development truly converge to foster genuinely sustainable and inclusive outcomes, especially given inherent human variability and its complex implications for educational design and policy.

This fundamental context of individual and societal variability highlights several critical areas where deeper understanding and innovative approaches are urgently needed:

- **Tailoring Entrepreneurial Learning to Diverse Individual Needs:** A significant challenge persists in designing entrepreneurial learning programs that genuinely adapt to varied cognitive styles, socio-emotional needs, and learning paces (He & Quay, 2025). This requires insight into how foundational skills, self-assessment mechanisms, and varying individual competencies dynamically influence entrepreneurial readiness and intention, moving beyond a uniform pedagogical model.
- **Equitable Integration of Emerging Technologies:** Despite their immense transformative potential (AI, VR, AR, blockchain) to personalize learning and democratize access, understanding how these technologies can be strategically utilized to accommodate for individual variability without inadvertently exacerbating existing digital divides or overlooking crucial ethical considerations and digital rights remains a complex undertaking (Iqbal et al., 2025a, 2025b).
- **Fostering Entrepreneurial Thinking within Broad Societal Contexts:** Entrepreneurial learning must evolve to serve all populations, which demands the development of educational policies and strategies that actively address historical marginalization and ensure equitable access for diverse communities, including indigenous groups. The influence of demographic shifts and persistent inequalities on entrepreneurial opportunities and learning outcomes remains a complex issue requiring nuanced, context-specific solutions (Baalbaki & El Khoury, 2025).
- **Holistic Integration of Sustainability and Social Impact:** While economic value creation is a traditional focus of entrepreneurship, there is an increasing demand for entrepreneurial education to incorporate sustainable practices and social entrepreneurship principles more deeply (Robles, 2024). The challenge lies in equipping learners to create ventures that balance profit with positive societal and environmental impact, fostering a broader sense of responsibility from the outset of their entrepreneurial journey.
- **Cultivating Supportive Ecosystems and Adaptive Leadership:** Effective entrepreneurial learning depends not only on individual initiatives but also on the strength of supportive ecosystems (academia, incubators, science parks) and the foresight of their leadership (Kyriakopoulos, 2024). A key challenge is understanding how these external environments and their leadership structures can be intentionally designed and managed to acknowledge, nurture, and facilitate the diverse entrepreneurial pathways of all learners, including addressing the impact of organizational climate and leadership styles on innovation and well-being.
- **Breaking Disciplinary Silos for Comprehensive Entrepreneurial Solutions:** The complexity of modern global challenges necessitates robust interdisciplinary collaboration. A significant gap exists in effectively integrating entrepreneurial concepts across diverse fields—from STEM to the humanities and social sciences—to foster creativity and adaptability, enabling learners to develop novel, holistic solutions that transcend conventional disciplinary boundaries (Audretsch et al., 2024).

2. Our Contribution: A Comprehensive Exploration

It is within this vital context, driven by the need to bridge these critical knowledge gaps, that our Special Issue, entitled “Sustainable Inclusion: Emerging Technologies, Innovative Learning Environments, and Entrepreneurial Learning in the Context of Individual and Societal Variability”, gains its profound significance. This collection of papers was

meticulously conceived to deepen our understanding of the dynamic interplay among innovative learning environments, entrepreneurial learning, and the broader entrepreneurial ecosystem. Our primary objective was to foster crucial discussions on the challenges, opportunities, and innovative pedagogical strategies essential for cultivating entrepreneurial mindsets, knowledge, and competencies across diverse learning contexts. This eBook places a strong and consistent emphasis on the nuanced dimensions of individual and societal variability, acknowledging that the pathways to entrepreneurial success and sustainable impact are not uniform but are profoundly shaped by unique personal circumstances, cultural backgrounds, and systemic factors inherent in the entrepreneurial learning journey. This comprehensive volume thus serves as a vital platform for PhD scholars, novice and senior researchers, entrepreneurship educators, educational policymakers, entrepreneurs, and practitioners. It invites them to engage in a comprehensive dialog on critical issues, persistent problems, and innovative trends in promoting entrepreneurship that is both resilient and equitable, with a clear focus on how individuals learn to become such impactful entrepreneurs. Within this complex and multifaceted context, this collection of works integrates theoretical understanding with empirical insights to provide a more comprehensive and actionable understanding of these interconnected areas.

3. Contributions of the Special Issue

This Special Issue significantly advances our understanding by addressing the aforementioned challenges related to individual and societal variability through diverse research. The published papers collectively offer a multifaceted view of entrepreneurial learning and innovative environments, providing key insights across several critical domains:

- **Foundational Skills for Entrepreneurial Readiness:** The contributions by Bashir et al. (2025) underscore how information literacy impacts entrepreneurial readiness, emphasizing digital competencies crucial for aspiring entrepreneurs. Ceresia (2023) presents an interactive learning environment for the online self-assessment of performance management capabilities, catering to individual learning styles and self-assessment needs. These papers explore how foundational competencies and self-perception influence entrepreneurial intentions and capabilities, offering valuable insights for designing more effective and personalized entrepreneurial education.
- **Organizational Context and Leadership in Fostering Entrepreneurial Learning:** A significant portion of this Special Issue delves into the organizational and leadership factors that shape innovative behavior and employee well-being within educational settings, which are foundational for cultivating entrepreneurial mindsets among students and faculty alike. Zargar et al. (2025) demonstrate how work engagement and perceived organizational support drive innovative work behavior among university teachers. Similarly, Hassanein et al. (2025a) explore the linkage between supportive leadership, perceived organizational support, and the organizational climate in terms of employee well-being in academia. Conversely, another contribution by Hassanein et al. (2025b) highlights the detrimental impact of toxic leadership on job satisfaction in the Middle Eastern education sector, underscoring societal variability in leadership effectiveness and its consequences for fostering an entrepreneurial culture. Furthermore, Rivera et al. (2025) emphasize the importance of relational capital within organizational contexts as a key component for facilitating entrepreneurial learning and collaboration.
- **Leveraging Technology for Sustainable and Inclusive Entrepreneurial Learning:** This Special Issue features papers directly exploring the nexus of technology, sustainability, and inclusion in entrepreneurial education. Cocu et al. (2025) offer a practical framework for integrating technology-enabled entrepreneurship education with a

focus on green and sustainable practices, providing concrete digital tools for educators. Fariña-Sánchez and Gutiérrez-Santiuste (2024) provide empirical evidence on gender disparities and the observance of digital rights among young entrepreneurs, directly addressing aspects of societal variability and the need for equitable access and protection in the digital entrepreneurial space, thus informing inclusive entrepreneurial learning strategies. Additionally, Shaukat et al. (2024) reinforce the importance of information literacy, creativity, and lifelong learning in media professionals, highlighting these skills as increasingly intertwined with digital entrepreneurial endeavors and continuous adaptation.

- **Promoting Interdisciplinary Approaches and Ecosystem Development:** While not explicitly separate themes in the paper listings, the collected works collectively demonstrate the value of interdisciplinary thinking and the nurturing of entrepreneurial ecosystems. By showcasing research from varied fields and contexts (e.g., ethical leadership in academia influencing innovation and digital rights for young entrepreneurs), this volume implicitly advocates for integrated educational frameworks and robust support structures that recognize and cultivate the unique contributions individuals from diverse backgrounds can bring to entrepreneurial endeavors. This highlights how formal and informal learning environments contribute to an overall entrepreneurial capacity, emphasizing the importance of supportive organizational and institutional climates for fostering innovation and entrepreneurial thinking among both faculty and students.

These papers, utilizing diverse methodologies—including quantitative surveys, qualitative interviews, and system dynamics modeling—and drawing insights from various geographical contexts, such as Turkey, Pakistan, Lebanon, and Europe, provide a nuanced understanding of how entrepreneurial learning and innovative environments interact with individual and societal variability. They offer context-specific insights vital for effective entrepreneurial education and policy development.

4. Future Research Directions

While this Special Issue has significantly advanced our understanding, the dynamic nature of emerging trends and the complexities of sustainable inclusion present fertile ground for future research, particularly concerning entrepreneurial learning. We propose several key areas for scholarly inquiry:

1. **Deepen Inclusion and Intersectionality:** Future research should explore the intersectional experiences of diverse groups (e.g., indigenous entrepreneurs, individuals with disabilities, refugees, or specific ethnic minorities) within innovative learning environments and entrepreneurial ecosystems (Krüger & David, 2020; Tamtik, 2020). More qualitative and mixed-methods studies are needed to capture these nuanced narratives.
2. **Longitudinal Impact Assessment:** Critical longitudinal studies are needed to track the long-term impact of innovative pedagogies on entrepreneurial success, sustainable practices, and social impact across diverse learner populations (Arendt et al., 2025; Herlina & Wahira, 2024).
3. **Ethical Implications of Emerging Technologies:** As AI and other advanced technologies integrate further, research must critically examine their ethical implications for entrepreneurial learners, including algorithmic bias in support systems, data privacy, and ensuring equitable access (Jain & Menon, 2023; Sahoo et al., 2024).
4. **Measure “Sustainable Entrepreneurial Mindsets”:** Develop robust metrics to assess the cultivation of entrepreneurial mindsets that prioritize environmental, social, and

governance (ESG) factors and identify effective pedagogical approaches for this (Lehmann et al., 2024; Ragazou et al., 2024).

5. **Policy Coherence:** Further empirical research is needed to evaluate policies promoting inclusive entrepreneurship education, including comparative studies across different national or regional contexts to identify best practices.
6. **Role of Informal Learning:** Explore the significant role of informal learning, mentorship networks, and community-based initiatives in fostering entrepreneurial learning and sustainable inclusion, particularly for those without access to traditional academic institutions (Suryono et al., 2023).
7. **Adaptive Leadership Models:** Investigate adaptive leadership models tailored for dynamic, technology-driven entrepreneurial learning environments, focusing on cultivating resilience, psychological safety, and continuous learning sensitive to individual and societal variability among entrepreneurial learners.

This Special Issue, entitled “Sustainable Inclusion: Emerging Technologies, Innovative Learning Environments, and Entrepreneurial Learning in the Context of Individual and Societal Variability”, represents a significant contribution to the ongoing discourse on entrepreneurship education and innovation. By synthesizing insights on emerging technologies, innovative learning environments, and entrepreneurial development, and critically examining them through the lens of individual and societal variability, this collection underscores the urgent need for approaches that are not only effective but also equitable and sustainable in fostering entrepreneurial capabilities.

The papers herein provide a robust foundation for understanding the complex dynamics at play in entrepreneurial learning, offering both empirical evidence and theoretical frameworks. We hope that this compilation will inspire further rigorous research, foster interdisciplinary collaborations, and inform the development of more inclusive and impactful entrepreneurial practices.

We extend our sincere gratitude to all of the authors for their invaluable contributions, to the diligent reviewers for their insightful feedback, and to the Editorial team of *Administrative Sciences* for their unwavering support. It has been a privilege to serve as Guest Editors for this Special Issue, and we eagerly anticipate the continued advancements in this vital field.

Conflicts of Interest: The authors declare no conflict of interest.

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Article

Entrepreneurial Education and Innovation Intentions Among University Students: A Structural Assessment of Opportunity Recognition, Psychological Capital, and Fear of Failure

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Abstract: In academia, innovation intentions among students are a highly sought-after outcome due to their overarching positive impacts on performance and well-being, especially in the higher education context. This research addresses entrepreneurial education and its influence on innovation intentions across several universities in Beirut, Lebanon. The research also examines the indirect effects of opportunity recognition and psychological capital as mediators and fear of failure as a moderator. Through the lens of the theory of planned behavior, the stimulus-organism-response model, and the entrepreneurial event model, a survey was designed. A total of 263 samples were collected from the students of three universities in Beirut where the academic setting was English, and international students were present. Using Partial Least Squares—Structural Equation Modeling, the data was analyzed, and the hypotheses were supported. Results suggest that the learning environment in universities is a major determinant of innovative outcomes for students. However, implementation of entrepreneurial education alone cannot be as effective as it needs to be; it must be complemented by initiatives that enhance perceptions and internal capabilities of students to achieve innovation in their behaviors. This highlights the vitality of psychological capital and fear of failure in this context.

Keywords: entrepreneurial education; innovation intention; university students; psychological capital; fear of failure; higher education; Lebanon

1. Introduction

Entrepreneurial education encompasses the learning environment in which students are equipped with the necessary skills and knowledge for identifying opportunities available, and an entrepreneurial mindset (Fayolle & Gailly, 2015). Such environments foster skill development, positive attitudes, and an awareness to seize available opportunities. Entrepreneurial education is a strategic practice in the higher education setting which can vastly improve the learning environment by simulating an entrepreneurial mindset among students while adequately preparing them for facing dynamic workplace markets. The positive influences of this educational setting have been reported in the literature, especially when it comes to positive intentions (e.g., entrepreneurship and innovation) among students (Küttim et al., 2014; Lv et al., 2021; Wang et al., 2021). While numerous studies have addressed the outcomes of an adequate educational model, its link with psychological capital and students' abilities remains scarce (Wang et al., 2023), which further drives the conduct of this research. This has been linked to the notion that entrepreneurial education can provide students with necessary knowledge and skills while improving their attitudes and perceptions towards taking business initiatives (Mónico et al., 2021). Such educational environments can have a major impact on shaping students' self-efficacy, motivation, and

positive behavioral outcomes (Wang et al., 2021). Despite the available literature, the variability of human behavior with regard to institutional methods, psychological traits, and mechanisms remains in need of further analysis due to its complexity. This can be especially witnessed in the case of the Middle East region and particularly the Lebanese context, which is in need of empirical evidence that not only addresses the education sector of the country but also provides tangible and meaningful results that can be used by decision-makers (Haddoud et al., 2024).

Entrepreneurial education can have varying effectiveness levels when applied in different settings (Duong, 2022), which has been mostly investigated in Southeast Asia and Western regions (Wang et al., 2023). Therefore, the current research addresses a gap in the literature where studies addressing the higher education sector of the Middle Eastern region are relatively less (i.e., Lebanon). Studies have shown that self-efficacy can mediate the effectiveness of entrepreneurial education as students internalize their learning environment, which leads to manifestation of intentions, attitudes, and behaviors (e.g., Anwar et al., 2022; Tian et al., 2022; Wang et al., 2023). However, these studies do not particularly examine the intricate mechanisms that link psychological capital and personal attributes of students to their innovation intentions. Thus, the current research focuses on the indirect effects of psychological capital, opportunity recognition, and fear of failure as psychological mechanisms that can predict students' behavior, particularly when exposed to an entrepreneurial setting. This further addresses noted gaps in literature where indirect mechanisms (e.g., psychological capital and opportunity recognition) and latent variables (e.g., fear of failure), and boundary conditions are examined empirically and with modern techniques (Haddoud et al., 2024; Thoudam et al., 2023; Villanueva & Martins, 2022) are included in the model (see Figure 1) to contribute to the existing body of knowledge in this context. The contributions of this research can aid scholars and university decision-makers in implementing entrepreneurial education while improving our understanding of its influences on students' mindset and behavioral outcomes.

Innovation intentions in this context can be described as a cognitive state of mind which leads to innovative behaviors (e.g., engaging in novel idea generation or actions) (Liñán & Chen, 2009). Opportunity recognition is regarded as the ability to identify viable options for entrepreneurial opportunities based on knowledge, skills, context, and alertness (Ardichvili et al., 2003). It requires a perception of emerging trends, an ability for problem-solving ability, and a solid understanding of the market. Psychological capital addresses a positive psychological state which contains optimism, hope, resilience, and self-efficacy (Luthans et al., 2006) for students, especially during their educational development programs. Fear of failure is often described as a negative emotional response to an expected failure which is a significant diminishing element for innovative behaviors (Conroy et al., 2002). This research argues that an adequate educational setting can yield innovative intentions among students, especially when their psychological capabilities are high, and their fears are confronted. In this sense, when students have a positive mindset and are provided with training, knowledge, and awareness regarding market and job prospects, they are more likely to develop positive intentions and exhibit innovation.

As this research explores the underlying psychological pathways to innovation intentions among students in higher education, it addresses the call for further studies on such contexts (e.g., Duong & Vu, 2024; Wang et al., 2023). Notably, these studies suggest that psychological capital can act as a crucial individual resource that increases the ability to use (perceived usefulness) the learning environment to form intentions that are desirable, feasible, and viable (Haddoud et al., 2024). In contrast, fear of failure can be a barrier to students' creativity, passion, and innovation in the entrepreneurial academic setting, leading to discouragement from initiative ventures (Chapman & Phillips, 2022; Thoudam et al.,

2023). The recent studies in literature tend to examine the performance outcomes whether on an institutional or individual basis, leaving a gap that is addressed in this research. It has been noted that while entrepreneurial educational settings can be determinants of positive intentional and behavioral outcomes for students, the role and effects of students' abilities (recognition of opportunity, psychological capital, and fear of failure) remain underexplored as the majority of studies focus on other elements (e.g., organizational elements, interactions, and learning outcomes). The current research aims to expand the merits of this stream of research by integrating a structural framework that accounts for both institutional and individual influences on innovation intentions among university students in Lebanon which faces several visible educational limitations (economic, political, and technological) (Ben Hassen, 2024). In this respect, the study operationalizes the variables into their components to ensure a solid interpretation of the results obtained, contributing to the entrepreneurial aspect of academia.

Following what was noted, this research endeavors to extend the geographic boundaries of the literature by examining the aforementioned factors among the universities of Beirut, Lebanon. Previous studies have not directly examined what is proposed in the current model (see Figure 1), leaving a gap in the discourse of modern educational models' effectiveness in defining students' intentions—shaping their behavior towards future careers and prospects. It has been noted that in the region of the Middle East (Aljuwaiber, 2021; Bodolica et al., 2021; Duong & Vu, 2024) and particularly in Lebanon (Dabbous & Boustani, 2023; Toufaily & Bou Zakhem, 2024) such topics remain underexplored, which further drives the conduct of this study as the current literature lacks sufficient data when it comes to entrepreneurial education models and the intricate psychological prowess of students that determines their intentional and behavioral outcomes. These considerations are to ensure contributions are made to the discourse regarding entrepreneurial education models in regions with institutional or structural limitations (i.e., Lebanon). Arguably, entrepreneurial education models can aid teachers in terms of having more engaged and motivated students, as the curriculum and faculty initiatives align with this strategy. In the following sections, the theoretical framework of the study, hypotheses, research methodology, measures, analyses, and discussions on the results are provided, respectively. The research is concluded by highlighting theoretical and practical implications while showcasing its limitations and avenues of exploration for future studies.

2. Theory and Hypothesis Development

2.1. Theoretical Framework

Theory of Planned Behavior (TPB) (Ajzen, 1991) provides a premise for explaining how human actions are influenced by three distinctive components namely, attitudes toward behavior, subjective norms, and perceived behavioral control. The combination of these components can shape the intention of an individual (innovation in the current case), which is the antecedent of actual behavior (action). TPB relates to the entrepreneurial context in the educational setting as students who perceive an entrepreneurial education environment can develop positive emotions (attitude). This is further complemented by a belief that peers, and other members (e.g., academic staff) are in favor of the entrepreneurial environment and subsequent actions (subjective norms), while having a sense of engaging in innovative behavior (perceived control). According to the literature, TPB components are under the influence of the quality of the higher education entrepreneurship settings (Ma et al., 2020). Intentions (i.e., innovation) are formed through TPB constructs among university students, and the supportive mechanisms of the education setting are key for driving positive outcomes (Su et al., 2021). TPB has been commonly used by scholars from various disciplines (e.g., nursing) where entrepreneurial intentions were found to be linked to self-

efficacy (Lim et al., 2021). TPB is thus relevant for addressing innovation intentions among university students as the educational setting integrates personal, and contextual factors (Tsordia & Papadimitriou, 2015; Lihua, 2022). This research argues that entrepreneurial education can positively influence perceptions of control over the execution of innovation as they are equipped with a relevant mindset. This is while opportunity recognition and psychological capital can act as internal engines that support positive attitudes and self-confidence with regard to innovative intentions and subsequently, actions.

In addition to TPB, the current research embeds Stimulus-Organism-Response (S-O-R) theory (Mehrabian & Russell, 1974) as it pertains to various aspects of the variables and relationship under examination. In this sense, S-O-R is rooted in environmental psychology and provides an explanation for the effects of external stimuli on internal states (organism), which in turn leads to a behavioral response. In the context of current research, entrepreneurial education is the stimulus that consists of various inputs (e.g., curriculum and extra-curricular activities). In the same way, the organism aspect can be represented by internal psychological processes for students (i.e., motivation, self-efficacy, opportunity recognition), and the intentions or behavior that are yielded (i.e., innovation) are considered as the response. S-O-R theory is commonly used by scholars investigating entrepreneurial intentions, particularly in the education setting, where creativity and confidence were reported among students (Pham et al., 2024). The supportive mechanisms of a university act as a stimulus where students can have various social interactions that can trigger their engagement in evaluating entrepreneurial and innovative actions (Duong, 2023; Jia et al., 2022). This research benefits from embedding the S-O-R theory to understand how an adequate entrepreneurial learning environment can initiate positive psychological responses among students, leading to their psychological resilience and ability to recognize opportunities. Contextual stressors can be transformed into innovative intentions when external factors effectively impact students' perceptions (Çera et al., 2022). It has been reported that when students possess certain skills—stimulus (e.g., ICT), it can influence creativity (organism) that leads to the exhibition of entrepreneurial and innovative behaviors (Duong et al., 2024; Faiz Rasool et al., 2024; Jia et al., 2022). Through this lens, a better understanding of educational environments' influence on innovation intentions can be gained as cognitive and affective processes for students are activated in a dynamic manner. This provides a complementary premise to the more static TPB model (Lihua, 2022).

Lastly, the Entrepreneurial Event Model (EEM) (Shapero & Sokol, 1982) is used in this research which suggests that entrepreneurial intentions and behaviors are derived from a process of shaping intention that is affected by perceived desirability, perceived feasibility, and the happening of the event. In the context of this research, an entrepreneurial education setting can arguably establish/trigger an environment that is desirable and feasible for students to be immersed in an engaging educational atmosphere. This can be a space where university students can perceive innovation as a desirable and achievable behavior which is supported by the educational environment. Innovative models applied in the education sector (i.e., entrepreneurial) can act as triggers for students to align their mindset, especially when faced with interactive and real-life scenarios (Čapienė & Ragauskaitė, 2017). Studies have shown that the inclusion of EEM in the curriculum can enhance the experience of students and simulate events that can trigger entrepreneurial, creative, and innovative intentions and behaviors (e.g., Alhaji et al., 2022; Boldureanu et al., 2020). Entrepreneurial models in education can reinforce the perception of feasibility to innovate as well as act upon opportunities (Boldureanu et al., 2020). Higher education environments can simulate triggering events (e.g., competition, entrepreneurship workshops, failure labs,

and pitching training) which push the students towards active engagement from their intentions (Ruiz-Rosa et al., 2022).

In this research, psychological capital has a positive influence on perceived feasibility. This is while opportunity recognition can improve the perception of desirability. In contrast, fear of failure can prevent students from obtaining achievements even when they are competent. In a structured educational setting, such components integrate EEM to explain the mechanisms with which educational initiatives (i.e., entrepreneurial) can guide the psychological processes of students to form innovative intentions, supported by cognitive and emotional stimuli. Therefore, EEM accounts for situational and emotional elements that can improve entrepreneurial thinking in dynamic environments (e.g., universities). Moreover, the S-O-R model provides the necessary context for understanding how an external stimulus can trigger desirable responses from organisms (Pham et al., 2024) which further aligns the current theoretical framework with the premises of EE in the current contextual setting. As students can be influenced by a variety of elements in the education environment (university), the alignment of these theories establishes a new perspective for examining the development of innovation intentions. Notably, TBP further provides a more rational and rigid theoretical framework in this context as it pertains to the link between attitudes and behavior, norms and values, and the perception of control (Ma et al., 2020). This structure provides a solid foundation for EE and S-O-R which are more dynamic comparatively. Thus, there are no redundant aspects among these theories but rather a complementary link that can contribute to the current understanding of the subject matter.

2.2. Entrepreneurial Education and Innovation Intentions

Entrepreneurial Education (EE) is a setting, in which innovation, creativity, and entrepreneurial initiatives are encouraged, which can be highly visible when applied in the higher education context (Wang et al., 2021). Cognitive, attitudinal, and behavioral aspects of students are addressed under the EE framework which can drive positive intentional and behavioral outcomes (Küttim et al., 2014; Lv et al., 2021). As EE encompasses the learning process of students, the practices of faculty become supportive and aligned with an entrepreneurial mindset, further promoting the generation and expression of innovation. EE has the tools to provide a comprehensive knowledge of business to students while tending to their psychological (i.e., cognitive and affective) needs which directly affects their intentions (Haddoud et al., 2024; Wang et al., 2023). In this research, EE is comprised of three distinct characteristics that are namely, knowledge and skills, attitude change, and perceived usefulness which reflect the influences of a strategic learning initiative on students' intentions (Fayolle & Gailly, 2015). This dimensionality enables this study to address pedagogical elements that can improve the experience of students by introducing modern modules, workshops, and training programs. TPB states that intentions are primary antecedents of behavior and are under the influence of subjective norms, perceived behavioral control, and attitudes of an individual (Ajzen, 1991). This reinforces the notion that EE with its components (i.e., knowledge and skills, attitude change, and perceived usefulness) can yield innovation among students by improving their self-efficacy, risk-taking, and a positive mindset for entrepreneurship (Ma et al., 2020; Wang et al., 2023). EE has also been shown to have increased innovation and engagement of students in Portugal (Mónico et al., 2021). It can be asserted that entrepreneurship-centric faculties can foster an atmosphere where students can develop innovation intentions.

Students' cognitive state can predict their innovative behaviors which are the manifestation of their intent regarding engaging in new and viable ideas or actions (Liñán & Chen, 2009). Referring to the premises of the S-O-R model (Mehrabian & Russell, 1974), EE can be considered as a stimulus which affects the internal attitudes and cognition of

students as organisms. In turn, this results in a behavioral intention as a response to the educational setting encouraging innovation and entrepreneurship (Çera et al., 2022; Duong, 2023; Duong et al., 2024). This is further in line with the previously noted linkage between EE and innovation intentions of university students as their innovation intentions are the response to the EE and its influences on their internal cognition and emotions as stimulus and organism elements, respectively. Psychological readiness achieved by EE under this premise can manifest itself as engagement in, and exhibition of innovative intentions. Similarly, the EEM model developed by Shapero and Sokol (1982) explains how perceived desirability and feasibility of entrepreneurial actions can trigger intent among students. EE can be inherently aligned with EEM frameworks to provide events that drive positive intentions with regard to the strategic vision of the university (e.g., innovation). Under this theoretical setting, and the worldwide shift towards innovation, students can have a better chance in their future careers. According to Duong (2022), EE can have varying levels of influence as it is context-specific, which may have different exposure and strategic implementation levels. However, it can be stated that EE can facilitate critical thinking by delivering skills to students which can affect their attitudes and their perception of usefulness regarding innovation or entrepreneurial intent. Accordingly, the following hypothesis is proposed:

Hypothesis 1. *Entrepreneurial Education positively influences Innovation Intentions among university students.*

2.3. Mediating Effect of Psychological Capital

Psychological Capital (hereafter PC) is comprised of four components namely, hope, optimism, resilience, and self-efficacy and is considered an individual's psychological resource, which acts as an enabler (Luthans et al., 2006). In the current context, PC is operationalized as a bridging mechanism that better converts EE practices into positive intentions (i.e., innovation) for students. EE under the EEM framework can improve psychological assets via skill and knowledge deliverance, which also contributes to resilience, consistency, and taking initiative for obtaining desired goals (Haddoud et al., 2024; Wang et al., 2023). Arguably, EE can influence hope (belief in success), optimism (tendency to attribute positive outcomes to internal factors), self-efficacy (belief in the ability to complete tasks and achieve goals), and resilience (adapting to change and returning from failure) (Luthans et al., 2006). TPB provides a lens through which the components of PC can be regarded as mechanisms that can aid EE as they improve perception of behavioral control (execution of innovation) and positive attitudes (development of innovation intent). The entrepreneurial model in education helps students in acquiring knowledge and further internalizing psychological factors which can empower their awareness and decision-making, leading to the formation of innovation intent (Anwar et al., 2022). Therefore, having a high level of PC can act as a bridge for EE models to further align the endeavors of the institution with those of the students. This is also in line with the premises of the S-O-R model where EE as a stimulus influences organisms' PC, which then acts as a response trigger (innovation intentions) (Duong, 2023; Pham et al., 2024). As PC is an internal process, it can help the individual to translate a stimulus into the desired or aligned behavioral and intentional outcomes. Recent studies have supported the notion that PC as a psychological structure can influence intention (e.g., Duong & Vu, 2024; Haddoud et al., 2024). These studies reported a higher tendency to act on intentions for students with higher levels of PC, which is in line with the current arguments.

PC and its components (i.e., self-efficacy, hope, resilience, and optimism) are regarded as a mediating factor in the current model (see Figure 1) where the EE—Innovation Intention linkage is better explained when students possess a higher level of capital that entails

their emotional, attitudinal, and behavioral factors. In other words, with PC, students can better understand the practices of EE which aims to provide them with knowledge of markets, trends, and business; positively change their attitude towards initiating ventures; and ensure useful outcomes in their future (Anwar et al., 2022; Pham et al., 2024). This internal capability can sustain the student's drive towards innovation-related attitudes and behaviors. The components of PC address important psychological processes that are entailed within both TPB and S-O-R models. Perceived behavioral control and self-efficacy are linked under the premises of TPB. Moreover, both hope and optimism can be contributors to the formation of positive attitudinal outcomes (Lihua, 2022; Lim et al., 2021; Su et al., 2021). Furthermore, resilience is a match with the organism component which encompasses facilitation of stimuli (i.e., EE) processes in dynamic or failure circumstances (Duong et al., 2024; Faiz Rasool et al., 2024). The current study takes these delicate interconnections into account for developing the survey. Referring to the premises of EEM, PC can be influential in shaping students' perceptions of the feasibility of innovation, especially as they gain more confidence in their abilities in the EE setting (Boldureanu et al., 2020; Ruiz-Rosa et al., 2022). These internal mechanisms can link what EE offers to the development of positive intentions among university students as they are made more aware of business ventures and entrepreneurial mindsets, motivating them to take novel actions while remaining resilient. Psychological resources such as PC can be vital for students as they provide mental power for facing uncertainty, academic stress, and changing labor environments. Students who possess PC can turn the knowledge gained in EE into meaningful plans and actions, leading to a strategic vision towards their goals. Accordingly, the following hypothesis is developed:

Hypothesis 2. *Psychological capital and its components mediate the relationship between Entrepreneurial Education and university students' Innovation Intentions.*

2.4. Mediating Effect of Opportunity Recognition

Opportunity Recognition (OR) is regarded as one's capability to identify, examine, and make decisions on viable entrepreneurial or innovation projects in this context (Tian et al., 2022). This is a crucial ability in the EE environment as it can translate the framework of the institution into avenues of prosperity for students to improve and shape their future careers. This is categorized into pattern recognition (understanding emerging trends), market awareness (comprehending the mechanisms in different sectors and regions), and creative problem-solving (the will and the know-how to tackle existing or upcoming challenges) (Ardichvili et al., 2003). In the context of EEM (Čapienė & Ragauskaitė, 2017; Shapero & Sokol, 1982), perceptions of feasible and desirable outcomes of entrepreneurial actions are vital for shaping intentions of students (Alhaji et al., 2022). In an educational environment where entrepreneurship is encouraged and strategically embedded, students are trained to evaluate and be alert for changes in markets, technologies, and consumer needs (Mehdizadeh et al., 2021; Tian et al., 2022). This shows a foundation for the competency of evaluating opportunities, acting as a link between the effectiveness of EE and the intent of outcomes for innovation. OR is a core psychological element that within entrepreneurship education can drive students' attitudes towards innovation (Wang et al., 2021), which aligns with the current contextual arguments.

The S-O-R model in this context can be employed to explain the practices of a faculty under the EE structure which as a stimulus, sharpens the capacities of students as organisms to recognize opportunities, ultimately shaping their intentional responses (i.e., innovation) (Duong, 2023; Çera et al., 2022). Such dynamics are more visible in higher education settings due to volatility and inclusion of various aspects (e.g., social, psychological, physical) of one's life. Under the EE structure, faculties can facilitate access to networks, mentors, role

models, and internships where students can be stimulated by real-life application of what they learn, contributing to their ability to recognize opportunities. As OR is contextual (Anwar et al., 2022; Mehdizadeh et al., 2021), it is important that alertness, trend understanding, and experiences are fostered in the educational setting as EE provides. Students can then have a more fluid and dynamic learning process, through which their willingness towards entrepreneurship and innovation is increased (Alhaji et al., 2022; Tian et al., 2022). This also aligns S-O-R and EEM theories in this context as when entrepreneurship is perceived as feasible and desirable—the value of a possible opportunity, and the belief in abilities enabling the individual to exploit the opportunity—it can trigger idea generation and manifest innovation intentions and actions. In this research, students address their OR in a self-reported manner that includes its dimensions (i.e., pattern recognition, market awareness, and creative problem-solving). In light of what was mentioned, the current study proposes the following hypothesis:

Hypothesis 3. *Opportunity Recognition has a mediating impact on the Entrepreneurial Education–Innovation Intentions relationship in higher education.*

2.5. Moderating Effect of Fear of Failure

Fear of failure (FF) has been considered a hindering factor when it comes to entrepreneurial or innovative actions. When a failure is anticipated, individuals develop a negative emotional response which is regarded as FF (Conroy et al., 2002). The overall effort undertaken in the EE context is to give students confidence and increase their awareness and alertness for risk-taking, while enabling their psychological resources to face entrepreneurial settings. However, when individuals possess FF, a resistance towards engaging in innovative behaviors is developed which negates students' intentions to avoid negative outcomes (Chapman & Phillips, 2022; Thoudam et al., 2023). Under the lens of TPB (Ajzen, 1991), attitudes and self-efficacy are vital for forming intentions of individuals. This is while FF as a negative affective factor can negate perceived behavioral control which leads to intention avoidance. This has been reported for students as when fear is heightened, their willingness to act on their intentions is reduced, regardless of having EE as their learning environment (Villanueva & Martins, 2022). This implies a boundary condition that can alter the effectiveness of EE on shaping innovation intentions among university students, which is considered a diminishing moderator in the current model (see Figure 1).

This indirect influence of FF on intention development can be explained using the S-O-R model, where EE (stimulus) endeavors to trigger cognitive and emotional responses (organism). However, FF introduces a diminishing dynamic which hinders this internal process towards forming a positive response to the stimulus (Anwar et al., 2022; de Sousa-Filho et al., 2023). Therefore, FF weakens the link between the learning stimulus and the psychological response. When the fear is at high levels, the educational inputs are not converted into intent, implying a vital influence of a negative emotional boundary when compared to the positive ones (Yousaf et al., 2021). A recent study supported this dynamic by reporting that gender and FF moderated the formation of intention among university students (Duong & Vu, 2024). Similarly, reports show that students who exhibit creativity and motivation could show highly negative outcomes when their FF rises, implying the diminishing impact of fear on innovation intentions in an entrepreneurship-centered educational environment (Thoudam et al., 2023). Anxiety, self-doubt, risk aversion, and various other elements can instill fear in students, triggering FF as an emotional response and thus deterring them from innovative intents. Such strong psychological factors can negate the effectiveness of EE as they form an internal barrier to the intended empowerment and inspirational messages and practices. This can become so vivid to a point where

even possession of skills and knowledge along with support structures cannot drive entrepreneurial and innovative intentions and behaviors (Chapman & Phillips, 2022). This requires a comprehensive program in EE that addresses fear, openly discusses failure, and provides support for risk management and innovation. In the academic setting, social judgment from peers, performance, and mental and physical resources are challenged, which further highlights the importance of understanding how EE can improve the learning environment to foster innovation through empowering students and meeting their needs for knowledge and competence. The current sample includes students from universities where institutional limitations exist. This can highlight how fear interacts with EE in determining innovation intentions in higher education in Lebanon, leading to the development of the following hypothesis:

Hypothesis 4. *Fear of Failure moderates the relationship between Entrepreneurial Education and Innovation Intentions of university students in Lebanon.*

Following the premises of the research, its theoretical setting and hypotheses, a causal model is proposed which is illustrated in Figure 1 below:

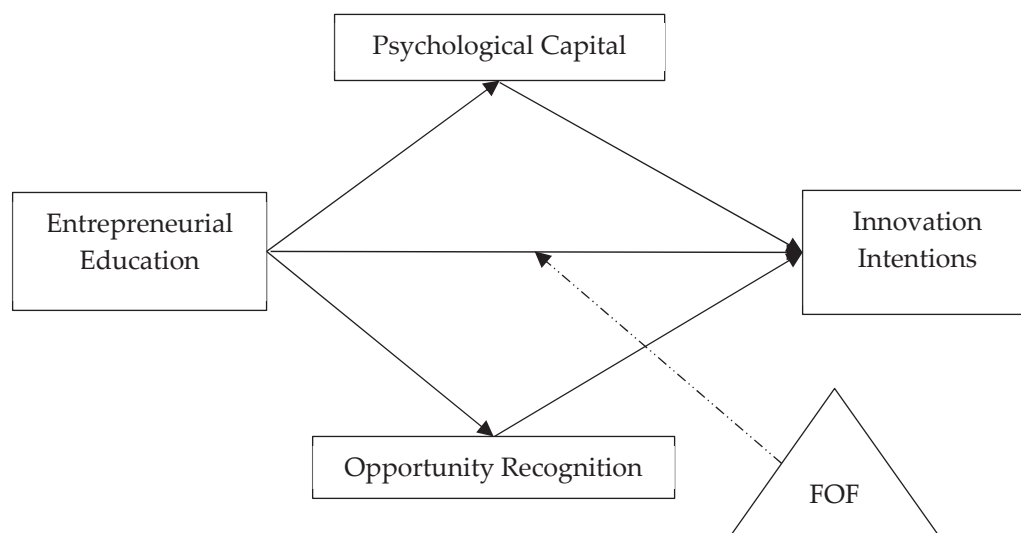


Figure 1. Research Model.

3. Research Design

3.1. Methodology and Approach

This study employs a deductive and quantitative design as it has been deemed appropriate for such studies (e.g., Lim et al., 2021; Su et al., 2021). A convenience sampling method was used to collect data from three universities in Beirut, Lebanon. This was deemed appropriate as the deans accepted the collection of data through their e-learning system. Therefore, the adequate approach was to ensure that any student willing to participate at their own time, could participate. The decision-makers of the university (i.e., deans and the ethical committee) were informed and necessary permissions were granted. This approach enables the researchers to test hypotheses based on available theoretical frameworks (Casula et al., 2021). Using G*Power software (version 3.1), the necessary sample size was calculated to be 210, which when combined with the recommended thresholds, reached 258 (Hair et al., 2017). To maintain the statistical power of 90%, effect size of 0.15 and $\alpha = 0.05$, a total of 300 surveys were distributed through SMS (via WhatsApp or Telegram) from which 263 were returned and qualified for analysis (87.66% response rate) after removing the incomplete responses. The contacts or numbers were not shared as the deans

were requested to create a group where survey information was shared and responses gathered. An unwritten consent form accompanied the survey in which participants were informed of the aims of the study along with ethical means of conduct (i.e., data confidentiality, anonymity, and voluntary participation) was shared in the group. The researcher had access to the group during the data collection process and provided information and answers when needed. Prior to this stage, a pilot test was deployed in a fourth university where items were tested for readability and adequacy as well as internal reliability. No dimensions or items were removed after the pilot test and the 20 samples were redacted from the final dataset under analysis. The universities chosen for the study had English instruction programs with international students. Thus, the survey was not translated.

3.2. Respondents' Profile

In Table 1, the demographic items of the survey are reported where age, gender, and level of education are included. Notably, these variables are controlled in the current analysis as they can have impacts on the dependent variable (i.e., innovation intentions among students) (Alhaji et al., 2022; Ruiz-Rosa et al., 2022).

Table 1. Demographics.

Age	Frequency	Percentage
18–21	86	39.3%
22–26	85	38.8%
27–30	32	14.6%
+30	16	7.3%
Gender		
Male	118	53.9
Female	101	46.1
Education		
Bachelor	152	69.4%
Masters	58	26.5%
PhD	9	4.1%

3.3. Measurements

The current survey includes a total of 40 questions addressing the variables in the proposed model (see Figure 1). All questions are designed in a 5-item Likert scale (1—strongly disagree to 5—strongly agree). Various reliable, commonly used, and valid measurement scales were derived from the existing literature which are as follows:

Entrepreneurial education and its dimensions (i.e., knowledge and skills, attitude change, and perceived usefulness) are measured by three questions for each dimension derived from the work of Fayolle and Gailly (2015). Psychological capital is measured by four distinct characteristics (self-efficacy, hope, optimism, and resilience) with a total of twelve questions taken from the work of Luthans et al. (2006). Innovation Intentions is regarded as unidimensional in this research and is addressed by five questions in the survey, developed from the work of Liñán and Chen (2009). Opportunity recognition is operationalized with three dimensions namely, pattern recognition, market awareness, and creative problem-solving, and is measured by three questions addressing each dimension (Ardichvili et al., 2003). Fear of failure is measured by five questions that were derived from the work of Conroy et al. (2002).

4. Analysis and Discussion

4.1. Analysis and Results

This research employs Smart-PLS software (v.4) to conduct Partial Least Squares—Structural Equation Modeling (PLS-SEM) technique on the data collected. This analytical technique is appropriate for the current model due to the existence of latent variables, a sample size that is limited, and a lack of concern for normal distribution (Hair et al., 2017). PLS-SEM consists of two stages, where the measurement model and the structural model are analyzed, respectively.

The results of the measurement model assessment are provided in the following tables. As can be seen from Table 2, the measures show satisfactory thresholds as, the outer loadings, Rho A, alpha, and composite reliability are between 0.7 and 0.9 (Jöreskog, 1971; Diamantopoulos et al., 2012; Dijkstra & Henseler, 2015; Henseler et al., 2014; Hair et al., 2019). Moreover, the average variance extracted value (AVE) (>0.5) implies that convergent validity is satisfactory.

Table 2. Measurement Model Assessment.

Factors	Dimensions	Indicators	Outer Loadings	Alpha	Rho A	CR	AVE
Fear of Failure	—	FF1	0.723	0.803	0.812	0.795	0.662
		FF2	0.734				
		FF3	0.731				
		FF4	0.742				
		FF5	0.740				
Innovation Intentions	—	II1	0.778	0.811	0.817	0.801	0.677
		II2	0.803				
		II3	0.788				
		II4	0.796				
		II5	0.793				
Opportunity Recognition	Pattern Recognition	OR1	0.721	0.806	0.811	0.811	0.679
		OR2	0.733				
		OR3	0.741				
	Market Awareness	OR4	0.717	0.788	0.769	0.786	0.680
		OR5	0.729				
		OR6	0.723				
	Creative Problem Solving	OR7	0.714	0.769	0.774	0.787	0.673
		OR8	0.722				
		OR9	0.719				

Table 2. Cont.

Factors	Dimensions	Indicators	Outer Loadings	Alpha	Rho A	CR	AVE
Psychological Capital	Self-efficacy	PC1	0.781	0.761	0.771	0.778	0.675
		PC2	0.743				
		PC3	0.737				
	Hope	PC4	0.766	0.772	0.801	0.787	0.701
		PC5	0.774				
		PC6	0.775				
	Optimism	PC7	0.762	0.769	0.789	0.775	0.671
		PC8	0.771				
		PC9	0.764				
	Resilience	PC10	0.773	0.792	0.793	0.782	0.692
		PC11	0.752				
		PC12	0.761				
Entrepreneurial Education	Knowledge and Skills	EE1	0.779	0.799	0.791	0.791	0.703
		EE2	0.803				
		EE3	0.788				
	Attitude Change	EE4	0.809	0.794	0.798	0.808	0.701
		EE5	0.793				
		EE6	0.798				
	Perceived Usefulness	EE7	0.811	0.813	0.807	0.810	0.711
		EE8	0.807				
		EE9	0.796				

Convergent validity is also confirmed by the results in Table 3 where the values of heterotrait-monotrait (HTMT) are below 0.85 (Hair et al., 2017; Henseler et al., 2015) which align with the values calculated for AVE (see Table 2).

Table 3. Heterotrait-Monotrait ratio (HTMT).

	PR	MA	CS	SE	HP	OP	RC	KS	AC	PU	FF
PR	-										
MA	0.621	-									
CS	0.581	0.633	-								
SE	0.652	0.642	0.711	-							
HP	0.633	0.639	0.652	0.662	-						
OP	0.612	0.621	0.652	0.655	0.665	-					
RC	0.673	0.649	0.618	0.644	0.621	0.671	-				
KS	0.636	0.623	0.619	0.642	0.634	0.663	0.685	-			
AC	0.591	0.586	0.603	0.599	0.613	0.642	0.644	0.660	-		
PU	0.620	0.616	0.587	0.619	0.593	0.601	0.611	0.628	0.676	-	
FF	0.582	0.591	0.610	0.5296	0.609	0.613	0.582	0.594	0.639	0.646	-
II	0.629	0.631	0.665	0.617	0.639	0.644	0.652	0.655	0.647	0.673	0.689

The results in Table 4 state that the Variance Inflation Factor (VIF) values are below the acceptable threshold of 3 (Henseler et al., 2009). This implies that there are no concerns regarding multicollinearity for the reflective variables of the research and their dimensionality.

Table 4. Reflective-Formative Construct Assessment.

Construct	Items	Convergent Validity	Weights	VIF	<i>t</i> -Statistics
Psychological Capital	Self-efficacy	0.714	0.336	1.811	3.025
	Hope		0.345	1.772	3.002
	Optimism		0.330	1.783	3.040
	Resilience		0.331	1.791	3.025
Opportunity Recognition	Pattern Recognition	0.710	0.328	1.790	3.101
	Market Awareness		0.329	1.787	3.088
	Creative problem-solving		0.330	1.776	3.105
Entrepreneurial Education	Knowledge and Skills	0.711	0.322	1.778	3.026
	Attitude Change		0.331	1.802	3.040
	Perceived Usefulness		0.329	1.769	3.033

The results presented in Table 5 show that the structural model has a good fit level, as both values of the Normal Fit Index (NFI) and Standardized Root Mean Square Residual (SRMR) are satisfactory (0.923 and 0.024, respectively). Similarly, R-square (predictive power) and Q-square (predictive relevance) show satisfactory values (Hair et al., 2019). The results show that the hypotheses have been supported.

Table 5. Structural Model Assessment.

Effects	Relations	β	<i>t</i> -Statistics	F^2	Decision
Direct					
H1	EE $\rightarrow$ II	0.343	4.428 **	0.103	Supported
Mediation					
H2	EE $\rightarrow$ PC $\rightarrow$ II	0.307	2.804 *	0.105	Supported
H3	EE $\rightarrow$ OR $\rightarrow$ II	0.312	2.851 *	0.109	Supported
Moderation					
H4	EE*FF $\rightarrow$ II	−0.318	−3.012 *	0.113	Supported
Control Variables					
	Gender $\rightarrow$ II	0.114	2.014 *		
	Age $\rightarrow$ II	0.123	2.032 *		
	Education $\rightarrow$ II	0.127	2.041 *		
$R^2_{PC} = 0.33/Q^2_{PC} = 0.17$ $R^2_{OR} = 0.44/Q^2_{OR} = 0.28$ $R^2_{II} = 0.49/Q^2_{II} = 0.31$ SRMR: 0.024; NFI: 0.923					

* 0.05; ** 0.01.

4.2. Discussion

The first hypothesis is supported ($\beta = 0.343$, $t = 4.428$) which confirms that an entrepreneurial education environment in universities can foster innovation intentions among students as it pertains to their need for knowledge and skills, mindset and attitude, and their understanding of the value of what they learn (perceived usefulness). It has been noted that EE can improve students' behavioral outcomes through the provision of support

and awareness regarding entrepreneurship, leading to higher creativity and innovation (e.g., Duong et al., 2024; Haddoud et al., 2024; Wang et al., 2023) which aligns with the current findings. This suggests a similarity between Lebanese students and other regions which highlights the contributions of the research. Furthermore, universities in the country and the region of the Middle East can improve their learning environments to further encourage innovative outcomes. This finding contributes to the scarcity of studies investigating new educational dynamics across the higher education of Lebanon and the region, particularly when considering institutional and structural limitations (Dabbous & Boustani, 2023; Toufaily & Bou Zakhem, 2024). The noted similarity resonates with the existing literature as TPB theory supports the notion that intentions are driven by attitude, norms, and perceived behavioral control which under EE are enhanced through exposure to the benefits of entrepreneurial models, development of skills, and ability to spot viable opportunities. Similarly, under EE settings, students are equipped with knowledge which enhances their perceived behavioral control and further softens the transformation of EE efforts into actionable intentions, further showing consensus and expanding the current discourse (Lv et al., 2021; Wang et al., 2023). Cultivation of proactive and creative behaviors among students can also be achieved through EE under both S-O-R and EEM models as cognitive abilities—essential for academic performance—are designed to aid students in fostering an entrepreneurial mindset which thrives on innovation (Lihua, 2022; Pham et al., 2024). The context-specific setting of this research provides further evidence from Lebanese higher education (Haddoud et al., 2024), emphasizing the practical implementation of entrepreneurial pedagogical models in this sector to establish a path for long-term benefits for society through fostering innovation among its youth.

The second hypothesis is found to be statistically significant ($\beta = 0.307$, $t = 2.804$) suggesting that possession of psychological capital can better convert the effectiveness of educational settings (EE) to actual intentions and behaviors of students in the realm of innovation and creativity. All dimensions of psychological capital (i.e., self-efficacy, hope, optimism, and resilience) show significance in terms of mediating the EE-Innovation intention relationship. Universities in Lebanon can benefit from initiating mentoring and support workshops with the specific aim of enhancing students' psychological capital and its components. These findings complement the current understanding in the literature (e.g., Anwar et al., 2022; Duong & Vu, 2024; Pham et al., 2024) by expanding the theoretical, contextual, and geographical borders of EE implementation and underlying psychological resources that can shape behavioral outcomes. In the dynamic environment of higher education, especially for Lebanon with its institutional limitations (Dabbous & Boustani, 2023; Toufaily & Bou Zakhem, 2024), a highly effective stimulus (EE) is required to specifically improve the psychological capabilities of students (organisms) with the aim of triggering innovation intentions among them (response), which aligns the current findings with the premises of the S-O-R model (Duong, 2023). EE initiatives under the scope of EEM are designed to provide knowledge, resilience, optimism, hope, and efficacy to students, which contribute to their psychological capital, rendering the translation of EE settings into innovative ideas more feasible. As faculty teachers under EE practices encourage and promote the previously noted elements, it also impacts attitudes, norms in the education environment, and perceived control, which show the relevance of the TPB model (Anwar et al., 2022; Duong & Vu, 2024). When students possess a high level of psychological capital, they are more likely to believe in their own skills (self-efficacy), be consistent towards their aims (hope), develop strategies to deal with setbacks (resilience), and have a positive view regarding their future (optimism). This yields innovation as it requires solution-finding and critical thinking to navigate (Pham et al., 2024). Therefore, the mediating role of psychological capital is visible in the results due to the notion that

students are able to utilize the EE practices to have a supportive and engaging learning environment that enables innovation. Attending to students' psychological well-being can have a major impact on the effectiveness of EE in the higher education setting of Lebanon, implying a critical strategic initiative that strengthens students' mental prowess.

The third Hypothesis is supported as can be seen in Table 5 ($\beta = 0.312$, $t = 2.851$), which implies that opportunity recognition can link the practices and efforts of EE to the formation of innovative intentions among university students. When students are equipped with the knowledge that provides them with pattern recognition, market awareness, and the ability to solve problems creatively, they are more likely to develop an interest in entrepreneurship and innovation in their business ventures. The current results are in consensus with the existing literature (e.g., Anwar et al., 2022; Duong, 2023; Mehdizadeh et al., 2021; Tian et al., 2022) but also highlight the importance and relevance of embedding programs in the EE structure to improve students' psychological capital, further nurturing innovation intentions. As an internal skill, recognition of opportunities through understanding patterns (existing and emerging), market dynamics, and problem-solving mindsets is crucial in determining students' innovation intentions in Lebanese universities, and perhaps neighboring countries with similar social, political, and cultural challenges and settings. This further highlights the merits of the current research in terms of advancing the extant literature of entrepreneurial education and innovation outcomes among university students. As noted with regard to the previous hypothesis, EE provides an educational environment where students are provided with various resources (e.g., the ability to identify viable opportunities) which shows the importance of individual attributes in this context particularly regarding intentional outcomes. Therefore, specifically designed initiatives that deal with this aspect are vital for EE models as the EEM framework suggests (Alhaji et al., 2022). It also integrates the premises of TPB through the integration of effective practices that drive positive attitudes. EEM emphasizes generating feasible and desirable perceptions to help students develop cognitive prowess and critical understanding to face potential opportunities (Mehdizadeh et al., 2021). Therefore, the mediating role of opportunity recognition resonates with being exposed to real examples of market gaps, economic variations, potential opportunity evaluation, and different decision-making strategies. Such practices enable students to perceive and interpret information in a meaningful and novel manner, resulting in innovative outcomes. When students are equipped with this skill, they can effectively make decisions with a clear vision towards their aim (Çera et al., 2022; Duong, 2023; Tian et al., 2022). In contrast, an inability to recognize opportunities can hinder performance outcomes especially if theoretical understanding does not translate into actionable insights. This further exhibits the mediating effect of opportunity recognition as a bridge between EE and innovation intentions among higher education students.

The fourth Hypothesis shows the moderating (diminishing) influence of Fear of Failure on the linkage between EE and innovation intentions of university students ($\beta = -0.318$, $t = -3.012$). The diminishing effect of fear of failure has been reported across the literature (e.g., de Sousa-Filho et al., 2023; Duong & Vu, 2024; Thoudam et al., 2023) suggesting that the Middle Eastern students especially Lebanese show similar behavioral traits when faced with elevated levels of fear. This dampens the effects of EE as employees who have a heightened fear of failure can disregard the institutional support systems as well as diminish their own capabilities and skills. These findings suggest that universities can embed psychological support systems that directly address fear factors and antecedents as well as initiatives that improve resilience when facing failure or having self-doubt. The current findings not only showcase the importance of negative emotions (fear of failure) for students' overall psychological state but also highlight how a comprehensive educational structure can provide the necessary means for students to face this crippling fear that can

negatively impact their future. Fear interacts with the perception of students in the EE setting and reduces the effectiveness of the educational model (EEM), especially in the context of Lebanon with the noted socio-economic fragility which mentally emboldens the challenges students face. This also negatively impacts their attitude, perception of control, and understanding of norms under the TPB model (Thoudam et al., 2023). Despite the efforts undertaken in EE models to foster a positive mindset towards innovative actions, fear of failure acts as a major barrier that negates positive elements. When fear of failure is high, self-efficacy, hope, optimism, and other psychological aspects lose efficiency regardless of the skills and competencies of the student (Chapman & Phillips, 2022; Villanueva & Martins, 2022). EE endeavors to establish knowledge-based skills for students to foster innovation but fear as an underlying psychological factor can prevent students from exhibiting action as forming intentions towards risky decisions (de Sousa-Filho et al., 2023). It can be stated that fear of failure can prevent students from seeking novel pathways rendering the EE model ineffective as the potential loss is perceived as higher when compared to potential benefits (e.g., success of an innovative idea).

5. Conclusions

The current study provides empirical evidence supporting the notion that entrepreneurial education can foster innovation among students. However, it is highly essential that the fear of failure is addressed to dampen its negative effects on the mindset of university students. Within the entrepreneurial education format, faculty can develop practices that contribute to the psychological capital and opportunity recognition abilities of students, leading to a positive influence on their mental, social, and academic performance while providing them with resilience and awareness. Through the lens of embedded theories (i.e., the theory of planned behavior, stimulus-organism-response, and the entrepreneurial event model) the research confirms that simply implementing entrepreneurial education in faculties does not suffice for achieving innovation intentions among students. Its effectiveness can be optimized through perceptions and internal capabilities which can act as enhancers or barriers for their intentions and behaviors. Thus, for an educational setting to enable students to thrive in innovative behaviors, the intricate balance of the psychological capacities of students should be taken into consideration.

6. Theoretical Implications

The current findings contribute to the extant literature on the integration of TPB, S-O-R, and EEM frameworks in a unified manner. The results suggest that TPB can be applied to both psychological capital and opportunity recognition in the context of the education sector and attitudinal and cognitive predictors of innovation intentions among students in higher education. This shows that the TPB can entail psychological variance and account for emotional responses in dynamic learning environments (Ajzen, 1991; Haddoud et al., 2024). This theory provides a comprehensive setting for linking institutional and individual factors addressing innovative outcomes in the education sector of Lebanon. While the application and relevance of TPB are clear in the existing literature, the current research focuses on the bridge between the psychological attributes of students and their intentional outcomes. Specifically, the importance of psychological capital as a mediating element that drives innovation intentions by encompassing the development of positive emotions, perceiving the support and alignment of peers, and a higher sense of engagement and control (Ma et al., 2020). The quality of higher education in Lebanon can be improved by the incorporation of such theoretical settings into the process of strategy definition for universities. Furthermore, TPB supports the notion that recognition of opportunities is essential when it comes to forming innovative intentions. The results show

that when this specific skill is developed, students are more prone to developing a positive mindset towards entrepreneurship (Duong, 2023). Lastly, TPB also shows relevance when interacting with fear as a psychological barrier to the effectiveness or lack thereof of the existing cognitive abilities supported by EE.

Similarly, the S-O-R model supports the notion that the cognition and emotions of students (organism) are processed under the influence of entrepreneurial education (stimulus) which leads to the formation of innovative and creative intentions (Mehrabian & Russell, 1974; Mehdizadeh et al., 2021; Tian et al., 2022). This advances the findings of recent studies as noted throughout the research, highlighting the theoretical implications and contributions of this study. This model comprises three aspects namely, the EE setting (also linked to TPB and EEM) influences the learning environment of students as organisms which ultimately triggers responses in the form of innovation intentions. This theory shows relevance to the notion of bridging psychological capital and opportunity recognition to the noted intentional outcomes. EE programs can include specifically designed practices for students to develop their psychological capabilities and understanding of the current market trends and strategic decision-making (Duong et al., 2024; Su et al., 2021). Notably, this theory is also applicable to the higher education context of Lebanon by encompassing how the effectiveness of EE initiatives can be negated by the existence of fear as a mental obstacle, setting positive intentions and decisions back.

Considering the premises of EEM, entrepreneurial education as a model can provide more than mere educational content but encompass psychological activation processes triggered by the perceived benefits of the model (Alhaji et al., 2022; Boldureanu et al., 2020). The EEM shows that higher education students can greatly benefit from faculty-wide entrepreneurial strategies with the aim of achieving innovation and resilience. Furthermore, fear of failure as a boundary/barrier mechanism for students' positive intentions and behaviors is modulated under this theoretical setting, which implies how educational practices in universities can foster lasting behavioral outcomes for students, sustaining an entrepreneurial mindset and innovative thinking. The EEM framework entails the importance of focusing on psychological capital and opportunity recognition as personal skills for students to face challenges and setbacks. Various event-based initiatives can be undertaken in the Lebanese universities to encourage engagement while tackling mental capabilities and challenges. Lastly, this theoretical combination shows that educational models act in a layered format and are bound to psychological states of students rather than a linear delivery-outcome process.

7. Practical Implications

University managers, deans, and administrative staff can benefit from the current findings by establishing programs in which students are offered actionable, strategic, and critical guidance which aligns the entrepreneurial setting of education with the long-term goals of students. This in turn can enhance their engagement, motivation, and positive emotions in their learning environment. Teachers can also emphasize entrepreneurial education aspects (providing knowledge and developing skills, changing attitudes, and improving perceived usefulness) by considering psychological capital and opportunity recognition of students. Their role can be more vivid due to their interactions with students on a personal level. This can also enhance the classroom environment as it goes beyond course content and standard curriculum. Support workshops, mentorship seminars, and skill-building training courses can improve students' sense of self-efficacy, optimism, resilience, and hope especially when they are designed to drive innovation. Such initiatives can also work on personal capabilities of students by addressing psychological capital, opportunity recognition, and fear of failure in scenarios, workshops, or coping

mechanisms to equip students with mental resources. Psychological support, social skills, motivational speeches, and customized training for developing different skills to understand trends, economic changes, and other practices such as strategic thinking, negotiation, statistical analysis, and data-driven approaches can be among these initiatives. In particular, practices that specifically address fear can be deployed to ensure that those students who even possess necessary skills are not faced with mental barriers that can hinder their education and future innovation. These educational environments will facilitate and hone students' skills which are vital for facing real-life opportunities and challenges while developing a sustainable academic structure, especially in culturally or institutionally rigid structures. Setbacks and failures in particular should be addressed and emphasized, as they can diminish the benefits and dynamics of an entrepreneurial education setting.

8. Limitations and Recommendations

While the previously noted contributions justify the conduct of this research, there are limitations that have restrained its process. However, these limitations also provide pathways for future research that can be tackled by other scholars interested in similar contexts. Quantitative studies are limited by sample size and cross-sectional nature which limit representativeness and generalizability of the data. This can be addressed by studies in which qualitative or mixed methods are employed to provide an in-depth and comprehensive analysis of psychological dynamics. Similarly, future studies can employ a large sample size to test and attune the current findings. The interrelationship between the mediators and the moderators of the model is not examined in this research, which can be addressed in future studies. Literature can also benefit from systematic reviews and/or meta-analysis studies where an integrated and comparative understanding can be presented. Furthermore, Longitudinal studies can examine how students' innovation intentions change before and after the implementation of certain entrepreneurial education practices to shed light on their effectiveness over time. The Regions of the Middle East and Northern Africa are underexplored when compared to Western and Southeast Asian regions, which can be addressed by scholars to further explore the current model in neighboring countries. While the current research benefits from a solid theoretical framework, other theories can be included in such contexts such as social exchange theory, organizational support theory, and leader-member exchange theory to examine teacher–student relationships. Cultural, social, and other demographic characteristics can be included in future models to build upon the current model and bypass its limitations.

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Article

Driving Innovative Work Behavior Among University Teachers Through Work Engagement and Perceived Organizational Support

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Abstract: Leaders are critical players in determining how their employees behave in the workplace. Particularly in higher education, teachers are required to utilize psychological, social, and physical resources to perform their tasks. This, along with institutional limitations, renders the role of ethical leaders more critical for driving positive performance outcomes. In this context, the current study investigates the role of ethical leadership on innovative work behavior of university teachers in Turkey. To provide a better understanding, mediating effect of work engagement and the moderating impact of perceived organizational support are also analyzed. With a total of 211 surveys gathered in a cross-sectional manner and using partial least squares—structural equation modeling with Smart-PLS software—the hypotheses were tested. By embedding social exchange, self-determination, and organizational support theories, the current study highlights the importance of the unique characteristics of ethical leaders in academia as antecedents of innovation for teachers, implementing long-term positive changes in the faculty. When institutional support systems exist, faculty deans can trigger engagement by leveraging the facilities and initiatives of the university, ultimately enhancing the learning environment of students while tending to the wellbeing of academic staff.

Keywords: ethical leadership; university teachers; perceived organizational support; work engagement; innovative work behavior

1. Introduction

In the academic sector, there is a high demand for innovation in teaching methods and research, as well as administrative responsibilities from academic staff. This is linked to the highly competitive environment that encompasses technological advancement, which changes the needs of students (Jia et al., 2022). This requires teachers who are engaged in their work and can initiate innovative methods and approaches to meet the needs of students in their learning processes (Islam et al., 2024). Notably, developing a faculty where teachers can engage in such behaviors also requires strategic planning, structure, and management within the faculty to provide support, mentorship, and guidance for the staff (Liu et al., 2023). This study specifically focuses on the antecedents of innovative work behavior among university teachers under an ethical leadership model that conveys positive communication, support, and care for the wellbeing of the staff.

Various reports in the existing literature suggest that an ethical leadership approach can yield innovative outcomes among employees in different sectors, linking psychosocial wellbeing, self-efficacy, and psychological safety as important elements (e.g., Islam et al., 2024; Liu et al., 2023; Uppathampracha & Liu, 2022). However, a gap is noted, as structural mechanisms concerning ethical leadership and their influence on innovative work behavior, particularly among university teachers, remain scarce. University teachers are pressured to effectively operate under institutional limitations while performing administrative, socio-cultural, and academic responsibilities (Jia et al., 2022). In addition to the noted gap, most studies tend to focus on Southeast Asian or Western countries (Ekmekcioglu & Öner, 2024), which limits the generalizability of findings in the regional context, especially in the Middle East, where institutional dynamics can significantly vary from those of the West (Balkar, 2024). Particularly in the case of the Turkish academic sector, where heavy task loads, complex structures, and economic or institutional restrictions are present (Işık et al., 2021), the notion of ethical leadership and behavioral outcomes among academic staff (i.e., innovative work behavior) remains underexplored. Furthermore, it has been noted that the context of leadership and employees' work outcomes has called for empirical evidence to provide a better understanding of various contextual settings (Yeap, 2024).

Accordingly, this study aims to address the noted gaps by examining the direct influence of ethical leadership on innovative work behavior among university teachers while exploring the indirect influences of perceived organizational support as a moderator and work engagement as a mediating variable. These concepts and their interrelationships are further explained in the following passages. It is important to note that these mechanisms have a logical and delicate linkage among each other, which has been examined in different sectors and disciplines in recent years (e.g., transformational and servant leadership, teachers' trust, performance, job satisfaction, and innovation) (Cann et al., 2021; Horoub & Zargar, 2022; Rasool et al., 2021; Musenze & Mayende, 2023). However, this study aims to contribute to the current understanding of how ethical leaders can drive innovation in the workplace in academia, where such work outcomes among teachers can have vast benefits for the university as well as students.

Complying with ethical means of conduct is highly essential in the context of academia, as university teachers and faculty members face various challenges in their roles that require leadership that provides support and follows ethics to foster a positive work environment for academic staff (Jia et al., 2022). In this sense, Ethical Leadership can be described as a leader who demonstrates normative, appropriate, and essentially ethical behavior and approach in their actions, communications, interactions, and decisions. This can enable their followers (i.e., university teachers) to be motivated, feel safe, and ultimately exhibit innovative behaviors in their tasks while showing a high level of performance (Brown et al., 2005; Yousaf et al., 2019). When academic leaders (e.g., faculty deans) conduct themselves ethically, their behavior yields a clear standard of fairness, which can foster trust, respect, and a tendency to perform better (S. Ahmad et al., 2018). Studies have shown that ethical leadership encompasses promotion of ethical behavior, fairness, focus on people (i.e., staff), and integrity (S. Ahmad et al., 2020), which renders this leadership style critical for academia as it pertains to work-related outcomes of faculty members as well as their overall wellbeing and retention due to decreasing negative experiences at work (e.g., stress and burnout) (Cann et al., 2021). This research examines the dynamics through which ethical leaders can act as fundamental players in the educational context to enhance teachers' performance, engagement, and innovativeness.

This research investigates the role of ethical leaders in determining innovative work behavior outcomes among academic staff in universities. Innovative work behavior (IWB) can be described as the creation, introduction, and application of new and elaborate

ideas within the work responsibilities that directly influence performance (Islam et al., 2024; Janssen, 2000). This construct encompasses aspects such as generating new ideas, promoting new solutions, and realizing how the said ideas can be implemented. Studies have noted that innovative behaviors among staff members are not isolated but rather manifest in different phases (generating creative solutions, advocating for their application, and implementing them) (Uppathampracha & Liu, 2022). According to Jia et al. (2022), the higher education context requires a high level of balance among teaching, research, and administrative roles, which renders IWB crucial for determining competitiveness and adaptability and resilience of the university (Hosseini & Haghighi Shirazi, 2021). This enables the university as well as the teachers to better align their efforts with the rapidly changing needs of students and social trends (Farrukh et al., 2022; Hosseini & Haghighi Shirazi, 2021). Recent studies have also pointed out the notion that leadership approach and style, psychological engagement, and organizational elements are critical elements in stimulating innovative behaviors among staff (Jehanzeb & Mushtaq, 2025). This shows a need for additional empirical evidence to better understand the predictors of IWB, especially in contexts that are less examined (i.e., higher education) and in countries that remain less explored (i.e., Turkey) (Balkar, 2024; Işık et al., 2021).

Perceived organizational support (POS) is an important factor in terms of predicting positive behavioral work outcomes among employees (Rhoades & Eisenberger, 2002), which can be described as a certain belief about the commitment level of the organization towards valuing employees and their contributions while providing genuine care for their wellbeing (Balkar, 2024; Eisenberger et al., 2016; Ekmekcioglu & Öner, 2024). In this research it is argued that ethical leadership in academia can yield IWB through the provision of necessary care and appropriate behaviors in the workplace by positively affecting the perceptions of staff regarding organizational support. POS is regarded as a sense of psychological safety and security that can empower the staff and establish emotional bonds between them and their institution. Employees with higher levels of POS are more likely to exhibit reciprocal behaviors while being motivated, involved, and engaged in their jobs while complying with ethical means (Shanock & Eisenberger, 2006). The literature suggests that the influence of positive leadership behaviors on work outcomes can be significantly enhanced if employees develop POS (e.g., Islam et al., 2024; Liu et al., 2023). Based on this understanding, this research operationalizes POS as a moderator that can amplify and strengthen the effects of ethical leadership on the innovative behavioral outcomes of academic staff. In this respect, ethical behaviors can foster a positive work environment in which taking risks, sharing ideas, expressing feelings, and involvement in solution finding are fostered and encouraged (Choi et al., 2021; Musenze & Mayende, 2023). POS enables this as it aids the employees in having a positive attitude and behavior for innovative behaviors as the system (i.e., leadership approach) recognizes and encourages such actions. The importance of POS becomes highly vivid in the case of academia, as there are rigid structures along with certain limitations that can hinder university teachers' jobs.

In addition to what was noted, this research also includes work engagement in its proposed model (see Figure 1). When employees feel positive, fulfilled, vigor, dedicated, and attached to their organization, they are engaged in their work (Schaufeli et al., 2002; Sarwar et al., 2020). Based on this description, work engagement can be considered a dynamic construct that entails motivational elements along with other psychological and emotional aspects, where those individuals with higher engagement levels are prone to invest a higher energy level into performing their roles. Being engaged also provides a certain level of resilience and immersion for employees (Ashfaq et al., 2021; Islam et al., 2024; Jia et al., 2022). This is a crucial matter in the academic setting, as university teachers are tasked with a variety of responsibilities that can be better performed if they are highly

engaged in their work. Arguably, leaders who behave fairly and provide genuine support and care to their followers (e.g., ethical style) can satisfy the psychological (e.g., competence, autonomy, and relatedness) needs of their followers, leading to a higher level of engagement and, ultimately, fostering innovation behaviors among the staff (Ekmekcioglu & Öner, 2024; Uppathampracha & Liu, 2022; Yousaf et al., 2019). Thus, it can be stated that work engagement entails psychological mechanisms, which can better deliver the leaders' efforts in supporting their staff. In return, a higher level of innovative performance in the workplace can be expected (Jia et al., 2022). Having engaged teachers at the university level can be a major tool for faculty leadership to improve the workplace environment by fostering innovation, especially in institutions where resources are limited (i.e., in the case of Turkey) (Akcil & Suhanberdyeva, 2022). Ethical leaders can leverage their characteristics to better implement a workplace in which academics can better cope with and perform well in a sector that has complex job demands (e.g., social, communication, technological, administrative, research, teaching, and other skills) (Jehanzeb & Mushtaq, 2025). In light of what was noted, this research investigates the indirect effect of work engagement on the relationship between ethical leadership and IWB.

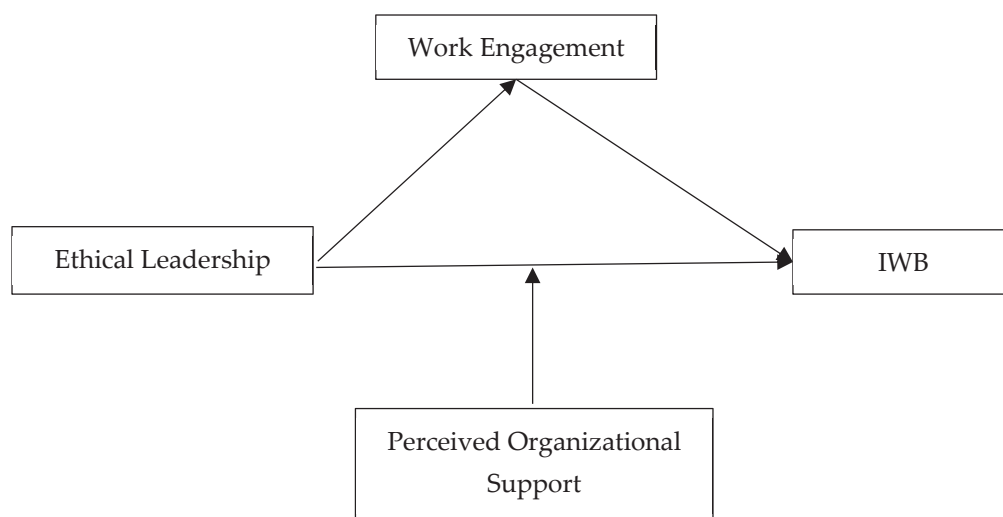


Figure 1. Analytical model.

This research offers a context-specific perspective on the stream of studies that investigate leadership and its implications in the academic setting to promote positive work behaviors among staff (Cann et al., 2021). Arguably, this can ultimately benefit the students by making their learning environment more resilient, agile, and modern, with their teachers fully engaged in their roles. Thus, the aim is to contribute to the current understanding of psychological mechanisms, especially through the lens of employees' perceptions and engagement levels. This is to address the previously noted gaps in the literature while addressing the areas that can be explored empirically (e.g., Islam et al., 2024; Jia et al., 2022; Sarwar et al., 2020; Jehanzeb & Mushtaq, 2025). Furthermore, this research focuses on motivational and contextual mechanisms (i.e., engagement and perceived organizational support) under the premises of social exchange theory (SET) (Blau, 1964), self-determination theory (SDT) (Deci & Ryan, 1985), and organizational support theory (OST) (Eisenberger et al., 1986). This framework provides a comprehensive explanation of the behavioral outcomes that can be derived through ethical leadership in academia as it enhances resourcefulness, psychological empowerment, and trust for teachers (I. Ahmad et al., 2023; Horoub & Zargar, 2022). The study also bridges the regional gap in the literature by addressing the higher education context of Turkey, which is less examined when compared to

Western or Southeast Asian regions (Ekmekcioglu & Öner, 2024). This can be beneficial for both scholars and faculty deans in improving the future outcomes of higher education.

The specific theoretical framework employed in this research provides a pathway to address the following questions:

- (1) Can ethical leadership predict innovative work behavior among university students in Turkey?
- (2) Does work engagement mediate this relationship? And
- (3) Does perceived organizational support moderate this relationship?

A deductive and quantitative approach is deployed in this research to address the noted questions using a survey to empirically test these dynamics. Similar studies in literature have employed this approach (e.g., S. Ahmad et al., 2020; Jehanzeb & Mushtaq, 2025; Rahmat, 2022; Zagenczyk et al., 2021), which further confirms its appropriateness. The theoretical setting (see Section 2.1) and the specific context of this study aim to shed light on the vitality of ethical leaders in improving resilience, dedication, involvement, enthusiasm, and determination among university teachers (Rahmat, 2022). This will not only improve the wellbeing of faculty teachers but further enhance the learning environment as teachers can better deliver knowledge through innovative means. The following sections will describe the theoretical framework, hypothesis development, research design, analysis, discussion, and conclusions. The research is then finalized by highlighting limitations and recommendations for future studies.

2. Hypotheses and Theories

2.1. Theoretical Framework

The current research benefits from combining three valid and commonly used theories to support the proposed hypotheses. In this sense, social exchange theory (SET), developed by Blau (1964), explains the innovative work outcomes of employees as a reciprocative behavior in response to the ethical behavior of leaders (i.e., faculty deans). Under the lens of SET, it can be interpreted that in social groups (i.e., faculty staff), ethical exchanges can reduce associated costs while increasing benefits. In this case, university teachers under ethical leadership perceive fairness, care, a transparent agenda, and support, which can trigger a positive work attitude in response (e.g., better engagement and IWB) (Islam et al., 2024; Sarwar et al., 2020). In the current model (see Figure 1), perceived organizational support (POS) further supports the notion of reciprocity as it pertains to signals of value, care, and supportive mechanisms in the organization that improve the overall experience of employees and, thus, their performance (e.g., IWB). Therefore, the premises of SET are highly relevant for understanding how ethical leadership can foster positive interactions and derive innovation from academic staff.

Furthermore, the current study employs the self-determination theory (SDT) (Deci & Ryan, 1985), which addresses the basic needs of individuals for autonomy, competence, and relatedness, which should be supported by leaders. Autonomy can be described as a sense of control over one's actions and choices; competence refers to the capability of effectively performing one's tasks; and relatedness encompasses the need to be connected to others and have a sense of belonging. If this criterion is met, then employees are more likely to show higher levels of engagement with their roles and engage in innovative behaviors (Ahmed Iqbal et al., 2020; Tsai, 2024). SDT provides a perspective through which motivational elements that can shape work engagement and innovative behaviors in academia are understood. In this sense, individuals are more likely to perform well, if their needs (i.e., autonomy, competence, and relatedness) are met. Ethical leaders possess the characteristics (i.e., fairness, altruism, honesty, integrity, and transparency) necessary to nurture these needs and therefore, yield high levels of engagement from their followers

(Uppathampracha & Liu, 2022; Liu et al., 2023). IWB is more likely to arise from engaged employees due to their internal motivation and willingness to thrive, especially when supported by the organization and its leadership. In the context of academia, there are various areas where faculty members can rely on autonomy and innovative behaviors to handle varying degrees of intense situations. Their contributions can be more creative and meaningful when they are equipped with the necessary tools, such as ethical leadership, supportive organizational practices, and intrinsic needs being satisfied (Chua & Ayoko, 2021; Hoang et al., 2023; Sarwar et al., 2020). Therefore, it can be stated that SDT can foster a work environment where ethical leadership, along with a supportive workplace can sustain engagement and derive IWB among faculty staff.

Organizational support theory (OST) (Eisenberger et al., 1986) is also embedded in this research as it pertains to perceptions of employees towards how they are valued, recognized, and cared for by the organization. Such perceptions can be critical for enhancing the effectiveness of leaders' efforts to improve employee work behaviors. Both obligation and commitment levels can be increased when employees feel supported in their institutional environment (Ekmekcioglu & Öner, 2024; Rhoades & Eisenberger, 2002), which can steer them towards exhibiting innovative behaviors (Musenze & Mayende, 2023; Shanock & Eisenberger, 2006). In the specific context of academia that requires intellectual and emotional resources from employees on a high level, OST can explain the dynamics through which ethical leaders can implement their efforts more efficiently (Shafait & Huang, 2023). This can ultimately improve the learning environment for students, enhancing the educational vision of the university as an organization.

2.2. Ethical Leadership and Innovative Work Behavior

Ethical leadership is the combination of certain characteristics that are, namely, fairness, power sharing, role clarification, people orientation, integrity, and ethical guidance (Brown et al., 2005). Fairness refers to a consistent, unbiased, and transparent treatment of employees; power sharing can be described as encouraging input and involvement in decision-making processes; role clarification addresses clear communication of expectations, responsibilities, and standards to comply with; people orientation demonstrates genuine concern for the overall wellbeing of others; integrity pertains to the extent to which leaders adhere to moral principles while maintaining their honesty and standards; ethical guidance includes active encouragement of ethical behaviors by engaging in role model activities. Both SET and SDT frameworks support the argument that these characteristics can be crucial antecedents of innovative behavior in an organizational setting. By addressing emotional, psychological, social, personal, and professional aspects of employees' lives, ethical leaders can significantly improve their wellbeing, leading to IWB (Ahmed Iqbal et al., 2020; Jia et al., 2022; Johari et al., 2021).

Ethical leaders have been reported to be highly effective in various organizational settings due to their ability to act as role models, be fair with high integrity, and show genuine care and support for their followers (Islam et al., 2024). This enables employees to internalize the leaders' behaviors while improving the workplace environment (Yousaf et al., 2019). Referring to the premises of SET (Blau, 1964), university teachers are highly likely to reciprocate ethical behaviors such as openness, support, and autonomy by engaging in innovative behaviors as well as proactivity. Psychological safety is another empowering element that ethical leaders can provide for teachers, where ideas can be shared freely and innovative behaviors are encouraged (Liu et al., 2023). Teaching and knowledge delivery methods along with administrative roles and research projects, imply a high level of innovation. Ethical leaders can build trust and exhibit morality in their judgment while

being open to sharing responsibility with others, which, in this case, aids faculty members in taking initiative (Hosseini & Haghighi Shirazi, 2021; Messmann & Mulder, 2015).

Innovative work behavior (IWB) is often categorized into three distinct dimensions, namely, (1) idea generation (creating useful ideas to troubleshoot processes, services, or procedures); (2) idea promotion (advancing the new ideas within the organization); and (3) idea realization (practically implementing innovative ideas to drive results) (Janssen, 2000). According to this operationalization, ethical leadership characteristics can be considered as major determinants of IWB among academic staff, which is in consensus with the existing literature (e.g., Jia et al., 2022; Sarwar et al., 2020). As leaders have the ability to improve the workplace culture and climate, they can establish a sense of respect, motivation, and psychological safety, which can manifest themselves as IWB (Ahmed Iqbal et al., 2020; Yeap, 2024). This is supported by SDT (Deci & Ryan, 1985), which incorporates how autonomy, competence, and relatedness can be satisfied by ethical behaviors of leaders (e.g., recognition of contributions, power sharing, and ethical guidance) (Musenze & Mayende, 2023). Therefore, academic staff can generate, promote, and realize ideas, especially as their roles require such initiatives. This research aims to contribute to the limited empirical research pertaining to Turkish academia by emphasizing this contextual framework for determining innovative performance among faculty members. Accordingly, the following notion is hypothesized:

Hypothesis 1: *Ethical leadership and its characteristics positively impact innovative work behavior and its dimensions among university teachers.*

2.3. Mediating Influence of Work Engagement

Work engagement can be explained as a positive state of mind towards one's job, which is often described with three dimensions: (1) vigor (resilient, energetic, and active at work); (2) dedication (high involvement level, enthusiastic behavior, and determination at work); and (3) absorption (highly focused and immersed in one's responsibilities at work) (Schaufeli et al., 2002). These dimensions are considered as a bridging factor that can better translate the characteristics and efforts of an ethical leader to their employees, particularly in the academic setting, to drive innovation (Rajashekar & Jain, 2024; Uppathampracha & Liu, 2022). Under the framework of SDT (Deci & Ryan, 1985), this research argues that ethical leaders can satisfy the psychological needs of their staff to enhance their engagement with their work. By exhibiting fairness, power sharing, and people orientation, ethical leaders can establish vigor, dedication, and absorption for university teachers, enabling them to exhibit IWB (Liu et al., 2023). As cognitive, emotional, and physical resources are depleted in academia (Horoub & Zargar, 2022; Rasool et al., 2021), ethical guidance, integrity, and role clarification can foster a workplace in which IWB is welcomed (I. Ahmad et al., 2023). In this context, faculty members can generate autonomous ideas and implement them in their tasks in an adaptive and resilient manner.

In addition to what was noted, SET (Blau, 1964), as applied in recent studies (e.g., Cann et al., 2021; Islam et al., 2024), supports the notion of ethical leaders can trigger reciprocity among their followers, which often manifests as different dimensions of work engagement. As having high levels of engagement at work can determine innovative outcomes, its mediating effect in the current research is supported. Engaged teachers at the university level can engage in extra-role behaviors such as proactivity, innovation, and citizenship behaviors (Chen et al., 2024). This enables them to stay up to date with modern teaching methods while being able to conduct new research projects and have an overall better performance in the faculty (Jia et al., 2022). Ethical leaders can tap into the intellectual resources of their staff in the faculty to nurture autonomy, competence, and relatedness, which subsequently drives innovative performance outcomes. In a non-Western context (i.e., Turkey), exploring the indirect effect of

work engagement on the relationship between ethical leaders and IWB among academic staff can further highlight the contributions of this research to the existing literature. Therefore, the research proposes the following hypothesis:

Hypothesis 2: *Work engagement mediates the relationship between ethical leadership and innovative work behavior in the Turkish academic sector.*

2.4. Moderating Impact of Perceived Organizational Support

Perceived organizational support (POS) is when employees believe their contributions are valued in the workplace. Furthermore, POS entails the sense of being cared for by one's occupation (Rhoades & Eisenberger, 2002). By considering the premises of OST (Eisenberger et al., 1986), it can be interpreted that individuals who perceive higher levels of organizational support have a relatively higher willingness to show positive behaviors at work (e.g., IWB). Ethical leadership characteristics can provide the conditions in the workplace that can help the formation of POS (Islam et al., 2024; Jia et al., 2022). In institutional structures where resource limitations can hinder processes (e.g., the academic sector in the Middle East and particularly Turkey) (Al-Husseini & Elbeltagi, 2016; Ersozlu et al., 2024; Ozbilgin, 2011), ethical leaders need to leverage human resource management mechanisms and practices to improve the workplace. As negative emotions can cultivate in such sectors, strong support systems (e.g., mental support, physical activities, and social initiatives) can amplify the positive influences of ethical leaders on driving innovation. This is also linked to the premises of SET, where support systems can provide a safety net for employees that further triggers their reciprocity to perform better (Eva et al., 2020; Zagenczyk et al., 2021). Similarly, the premises of SDT are relevant as fulfillment of relatedness can boost proactivity and positive behaviors in the workplace (Huang, 2025; Wang & Xu, 2019). Through a supportive work environment, faculty members can have positive experiences and higher job satisfaction, which directly contributes to their wellbeing (Jehanzeb & Mushtaq, 2025; Liu et al., 2023).

Universities often have a rigid structure that challenges change (Gallos & Bolman, 2021). Implementing supportive systems in the strategies of the university can reduce bureaucratic obstacles and act as an enhancer of innovative solutions for tasks, processes, and procedures (Rahmat, 2022; Zagenczyk et al., 2021). Such systems can also act as tools to shift the structure of the university from traditional formats to modernized frameworks. The Middle Eastern academic sector, and particularly Turkey, is reported to be limited, rigidly structured, and somewhat resistant to change (Ersozlu et al., 2024; Ozbilgin, 2011), which is yet another driver for the conduct of this research to contribute to this body of knowledge. This study argues that POS, as a psychological element, can be a significant enhancer for ethical leaders' endeavor to drive IWB in the academic sector. By examining this effect, the current research aims to provide practical implications for university decision-makers to foster greater performance on a faculty level. In light of what was mentioned, the following hypothesis is developed:

Hypothesis 3: *Perceived organizational support moderates the linkage between ethical leadership and innovative work behavior of faculty staff.*

3. Research Design

3.1. Methodology and Approach

As mentioned in the introduction section, a quantitative and deductive approach is employed in this research, in which a combination of purposive and convenience sampling methods is used to collect data from university teachers in Turkey. To achieve this, several universities were approached to ensure that ethical leadership characteristics can

be observed in the management of faculty deans. The researchers utilized their personal contacts to establish meetings (online and in-person) with a number of faculty deans, where the purpose of the research was explained, and the characteristics of ethical leadership were discussed. Upon confirmation of observing ethical leadership traits, the researchers asked for permission to obtain data from the faculty teachers. This approach aids the study to reduce the representativeness limitations of quantitative design by ensuring that the analytical setting of the study is aligned with its context. At this stage, the deans were asked to confirm the teachers who fit the selection criteria as follows:

Under the selection criteria, after ensuring that ethical leadership characteristics were visible in the management of the deans, the teachers who qualified for the research had to have teaching, research, and administrative roles. This purposive approach confirmed four universities to collect data from. At this stage, a convenience sampling method was used to collect data from the teachers who were available and willing to participate. Teachers were asked to provide responses in their free time to avoid disrupting of their work. The surveys were sent via email to the participants with a 10-day response timeline. The emails were sent by the faculty deans to ensure data confidentiality for teachers. Respondents were asked to return the surveys to the dean, after which the researchers collected the data. Using G*Power software (version 3.1), the sample size needed to maintain a statistical power of 90% with an effect size of 0.15 as well as a high confidence interval ($\alpha = 0.05$) was calculated to be 156. Referring to the recommendations of Hair et al. (2017), the optimum sample size was deemed to be between 156 and 225. Therefore, a total of 230 surveys were distributed among the teachers according to the selection criteria, from which 221 qualified for the final analysis (after removing incomplete responses). Respondents were provided with a written consent form, an option to withdraw at any point, the opportunity to participate voluntarily, data confidentiality, and anonymity to reduce common method bias (Podsakoff et al., 2024). To test for readability, and overall adequacy of the survey, an initial pilot test with 15 respondents was conducted, which was excluded from the analyzed model.

3.2. Participants' Information

Age, gender, and work experience were included in the survey as demographic characteristics. Importantly, these variables are used as control variables in the current analytical technique, as they can influence the dependent variable (IWB) according to various studies that have examined similar contexts (e.g., Ahmed Iqbal et al., 2020; Bernerth et al., 2018; Liu et al., 2023; Zhao et al., 2022). Table 1 presents the results of demographic characteristics of participants derived from the data collected:

Table 1. Respondents' characteristics.

Age	Frequency	Percentage
Below 28	7	3.2%
28–34	63	28.5%
35–40	84	38%
+40	67	30.3%
Gender		
Male	115	52.04
Female	106	47.96
Work Experience		
<3 years	76	34.39%
3–6 years	98	44.34%
>6 years	47	21.27%

3.3. Measurements

Several scales from the literature were chosen to measure the variables of this research from the most reliable and commonly used scales. In this respect, ethical leadership was measured with three questions for each dimension (fairness, power sharing, role clarification, people orientation, integrity, and ethical guidance) derived from the work of (De Hoogh & Den Hartog, 2008). Similarly, work engagement was measured based on the measures developed by Schaufeli et al. (2006), with three questions addressing each dimension (i.e., vigor, dedication, and absorption). Innovative work behavior and its dimensions (idea generation, promotion, and realization) were measured with three questions for each aspect based on questions derived from the work of De Jong and Den Hartog (2010). Lastly, perceived organizational support was measured with five questions adjusted to the current context (Eisenberger et al., 1986). All questions are designed to measure the responses based on a 5-item Likert scale from 1 = strongly disagree to 5 = strongly agree. A sample of the survey can be found in the appendix section (see Appendix A).

3.4. Research Model

In accordance with the operationalization of the variables as noted in the above section, and taking the contextual and theoretical setting of the study, a causal model is illustrated in Figure 1 below, which represents the hypotheses under investigation:

4. Analysis and Discussion

Smart-PLS software is used with the partial least squares—structural equation modeling (PLS-SEM) technique to analyze the model in Figure 1. This approach is deemed appropriate for this research as it contains latent variables, disregards normality in the distribution of data, and operates with a relatively small sample size (Hair et al., 2017). PLS-SEM consists of two distinctive analytical stages, namely, measurement model assessment and structural model assessment. In the first stage, confirmatory factor analysis (CFA) is deployed that examines the reliability and validity of measures and constructs of the model. This is followed by exploratory factor analysis (EFA), which further identifies the structures of the parameters. Upon completion of this stage, the structural model is assessed, where fit indices are used to evaluate the goodness-of-fit, predictive power, and relevance of the hypothesized relationships and effects (Hair et al., 2019).

Table 2 shows that the measurements in the current model are within the satisfactory statistical thresholds as (a) loadings are between 0.7 and 0.9 which indicates that observed indicators are their corresponding latent variable correlate, accurately measuring the factor; (b) Rho A, alpha and composite reliability values are satisfactory which represent that average correlation among items and consistency of internal parameters are accurately estimated and potential errors are adjusted; (c) average variance extracted values (AVE—convergent validity) are more than 0.5, implying a good level of explanation of constructs captured by the indicators in relation to the errors of the measurement (Jöreskog, 1971; Diamantopoulos et al., 2012; Dijkstra & Henseler, 2015; Hair et al., 2017, 2019). These values suggest that the indicators (items in the survey), the dimensions of the variables, and the variables themselves possess a satisfactory level of internal consistency, reliability, and validity, which implies that the measurement model is qualified for further analyses. This assessment is tested with a bootstrapping method which provides confidence intervals for the measurements, implying statistical significance of the results, which shows the robustness of the model (Hair et al., 2019).

Table 2. Measurement model assessment.

Factors	Dimensions	Indicators	Outer Loadings	Alpha	Rho A	CR	AVE
Ethical Leadership	Fairness	EL1	0.751	0.781	0.768	0.781	0.612
		EL2	0.754				
		EL3	0.762				
	Power Sharing	EL4	0.734	0.763	0.757	0.802	0.603
		EL5	0.748				
		EL6	0.743				
	Role Clarification	EL7	0.698	0.703	0.832	0.766	0.702
		EL8	0.711				
		EL9	0.725				
	People Orientation	EL10	0.731	0.722	0.811	0.749	0.684
		EL11	0.718				
		EL12	0.733				
	Integrity	EL13	0.749	0.745	0.809	0.732	0.705
		EL14	0.751				
		EL15	0.755				
	Ethical Guidance	EL16	0.759	0.739	0.795	0.744	0.649
		EL17	0.743				
		EL18	0.764				
Innovative Work Behavior	Idea Generation	IWB1	0.811	0.774	0.802	0.768	0.581
		IWB2	0.785				
		IWB3	0.752				
	Idea Promotion	IWB4	0.759	0.782	0.804	0.773	0.592
		IWB5	0.779				
		IWB6	0.784				
	Idea Realization	IWB7	0.764	0.764	0.794	0.748	0.613
		IWB8	0.766				
		IWB9	0.759				
Perceived Organizational Support	-	POS1	0.812	0.786	0.811	0.788	0.596
		POS2	0.733				
		POS3	0.783				
		POS4	0.776				
		POS5	0.739				
Work Engagement	Vigor	WE1	0.811	0.801	0.827	0.759	0.588
		WE2	0.809				
		WE3	0.807				
	Dedication	WE4	0.781	0.743	0.816	0.766	0.605
		WE5	0.804				
		WE6	0.792				
	Absorption	WE7	0.859	0.794	0.733	0.701	0.667
		WE8	0.863				
		WE9	0.721				

Table 3 represents the values for Heterotrait-Monotrait (convergent validity below 0.85) (HTMT) (Henseler et al., 2015), which, combined with what is shown in Table 2, state a satisfactory level of validity and reliability for the parameters included in the current dataset. The measurement model, therefore, is qualified, and the second stage of analysis can be deployed.

Table 3. Heterotrait-Monotrait ratio (HTMT).

	FR	PS	RC	PO	IN	EG	VG	DD	AP	IG	IP	IR
FR	-											
PS	0.701	-										
RC	0.445	0.523	-									
PO	0.732	0.614	0.701	-								
IN	0.613	0.654	0.644	0.671	-							
EG	0.614	0.622	0.651	0.677	0.715	-						
VG	0.611	0.595	0.640	0.613	0.643	0.676	-					
DD	0.511	0.526	0.579	0.586	0.578	0.603	0.713	-				
AP	0.603	0.621	0.629	0.597	0.590	0.613	0.644	0.659	-			
IG	0.669	0.611	0.549	0.579	0.620	0.633	0.679	0.608	0.701	-		
IP	0.612	0.634	0.598	0.574	0.560	0.577	0.519	0.583	0.589	0.684	-	
IR	0.675	0.591	0.618	0.674	0.639	0.619	0.594	0.649	0.677	0.681	0.731	-
POS	0.644	0.613	0.715	0.648	0.679	0.619	0.685	0.688	0.701	0.689	0.688	0.742

The dimensions of variables are coded in Table 3 to improve readability. These dimensions are FR = fairness; PS = power sharing; RC = role clarification; PO = people orientation; IN = integrity; EG = ethical guidance; VG = vigor; DD = dedication; AP = absorption; IG = idea generation; IP = idea promotion; IR = idea realization; and POS = perceived organizational support.

Table 4 shows the results of variance inflation factor (VIF) analysis, which represents multicollinearity. As the VIF value remains below 3, the reflective-formative (dimensionality) of variables shows no concerns regarding multicollinearity (Henseler et al., 2009). In addition to VIF values, the t-statistics also suggest that the calculations are statistically robust.

Table 4. Reflective-formative construct assessment.

Construct	Items	Convergent Validity	Weights	VIF	t-Statistics
Ethical Leadership	FR	0.713	0.352	1.819	4.001
	PS		0.356	1.745	4.011
	RC		0.361	1.746	3.878
	PO		0.349	1.846	3.944
	IN		0.353	1.711	3.988
	EG		0.357	1.766	4.044
IWB	IG	0.708	0.323	1.776	4.019
	IP		0.319	1.713	3.849
	IR		0.330	1.702	3.977
Work Engagement	VG	0.703	0.349	1.639	4.012
	DD		0.344	1.644	3.833
	AP		0.338	1.619	3.849

The results of hypothesis testing are presented in Table 5 where the structural model is assessed in PLS-SEM. As can be observed from Table 5, the direct influence of ethical leadership on innovative work behavior of academic staff is supported ($\beta = 0.344$, $t = 4.244$), which is in line with the first hypothesis. Similarly, the second hypothesis is supported, reflecting the mediating influence of work engagement on the ethical leadership—IWB linkage ($\beta = 0.314$, $t = 2.531$). The third hypothesis is also supported by the results ($\beta = 0.323$, $t = 2.679$) stating that POS can strengthen the effectiveness of ethical leaders in determining innovative work outcomes in the academic setting. The model shows a good level of fit, as predictive power and relevance and fit indices show in Table 5 (R-square, Q-square, NFI = 0.922 and SRMR = 0.023). While R^2 (determination coefficient) shows the proportion of variance of the dependent variable explained by the predictors, Q^2 is a representative of predictive relevance, which implies the out-of-sample predictive accuracy of the tested hypothesis (Hair et al., 2017). The goodness-of-fit measures show that the model possesses an overall good level of fit (NFI), while the average difference between the observed and predicted correlations is indicative of a good model (SRMR) (Dijkstra & Henseler, 2015; Henseler et al., 2009, 2014, 2015). Therefore, as the sampling criteria (see Section 3.1) establishes, the statistical findings are significant, and the support for the hypotheses of the research can be confirmed.

Table 5. Hypothesis testing.

Effects	Relations	β	t-Statistics	F ²	Decision
Direct					
H1	EL → IWB	0.344	4.244 **	0.103	Supported
Mediation					
H2	EL → WE → IWB	0.314	2.531 *	0.107	Supported
Moderation					
	EL * POS → IWB	0.323	2.679 *	0.110	Supported
Control Variables					
	Gender → IWB	0.112	2.302 *		
	Age → IWB	0.104	2.250 *		
	Experience → IWB	0.109	2.264 *		
$R^2_{WE} = 0.32/Q^2_{WE} = 0.14$ $R^2_{IWB} = 0.43/Q^2_{IWB} = 0.24$ SRMR: 0.023; NFI: 0.922					

* 0.05; ** 0.01.

The support for the current hypotheses, as shown in Table 5, suggests that the universities in Turkey can benefit from implementing ethical leadership in their faculties as a driver of innovation from faculty staff in their research, teaching, and administrative roles. While similar reports have been noted in the literature (e.g., Hoang et al., 2023; Islam et al., 2024; Sarwar et al., 2020), the current results expand the regional border of ethical leadership in academia while showcasing the application and relevance of social exchange theory (Rahmat, 2022; Subedi & Bhandari, 2024), self-determination theory (Hassan et al., 2024; Yeap, 2024), and organizational support theory (Shafait & Huang, 2023), building upon the recent studies in this context. While the noted citations have explored various aspects of EL and IWB, the current research contributes to the discourse by furthering the application of these theories. The findings contribute to the string of studies that address leadership and positive employee outcomes by shedding light on the importance of ethical leadership style in academia. This further addresses the noted gaps in the extant literature regarding empirical evidence that contextually and geographically expands the limits of the literature. When university teachers are provided with a workplace that is led by ethical leaders, they are steered towards IWB as vigor, dedication, and absorption dimensions of work engagement are in action. This has been observed in the extant literature (e.g., Jia et al.,

2022; Rajashekar & Jain, 2024; Uppathampracha & Liu, 2022), implying consensus with the current results. The contributions of this research include the mediating effect of work engagement, which is supported in the current findings, stating that Turkish universities can establish an environment where teachers are enthusiastic and determined, resilient, and immersed in their roles (Schaufeli et al., 2002). When faculty deans conduct ethical leadership style, they can leverage the available resources of the university (i.e., support mechanisms) to improve the workplace for academic staff, leading to a lean and agile faculty that thrives with innovative solutions, methods of teaching, and academic seminars and workshops. This highlights the contributions of this research as it pertains to the limited scope of the Turkish academic sector and the broader region of the Middle East (Akcil & Suhanberdyeva, 2022; Balkar, 2024; Ekmekcioglu & Öner, 2024).

Ethical leadership characteristics enable the leader and their subsequent influence on the workplace to drive engagement. This in turn can manifest in innovative behaviors to perform tasks (e.g., new teaching methods, enhanced classroom management, new research initiatives, and more effective administration). Furthermore, the enhancer role of POS supported in this research suggests that ethical leaders need an institution-wide supportive system that can aid them in improving the workplace and shaping positive attitudes and behaviors among the staff. There have been recent studies in which similar reports have been witnessed (e.g., Huang, 2025; Jehanzeb & Mushtaq, 2025). The current research highlights the enhancing role of POS by focusing on its protective dynamic in the organizational setting. The current results suggest that POS can act as a booster for the ethical leaders (especially when the university provides complementary practices and policies), leading to an overall enhanced emotion towards the university and its leadership. This in turn can trigger reciprocity and a sense of belonging among the academic staff, leading to an inclined willingness to engage in innovative behaviors. This finding expands the discourse on the effectiveness of institutional support systems that can be tools for leaders to improve academia for teachers, leading to a learning environment for students where creativity and innovation are encouraged. Through supportive systems that are established by Human Resources departments, an ethical leader in the role of faculty dean can significantly improve the behavioral outcomes and performance measures of faculty members, particularly among Turkish universities and, perhaps, neighboring countries (Ersozlu et al., 2024; Rahmat, 2022). Thus, although the current research shows consensus with the current body of knowledge, the addressed gaps and the context-specific framework ensure that contributions are made. The combined theoretical setting of SET, SDT, and OST enables new pathways for exploring innovative behaviors of employees in the organizational setting and particularly within academia.

5. Conclusions

The current research benefits from social exchange theory, self-determination theory, and organizational support theory to provide a better understanding of the delicate psychological and relational frameworks through which ethical leaders can foster innovative work behavior among academic staff. By expressing fairness, sharing power, clarifying roles, and showing care for people, integrity, and ethical behavior, faculty deans can satisfy the psychological reward, cost assessment, expectations, and comparison elements for teachers. Moreover, such a leadership style can act as a social mechanism for improving autonomy, competence, and relatedness, leading to higher engagement (i.e., vigor, dedication, and absorption) at work. Subsequently, teachers will be more motivated and open to absorbing the efforts of their leaders (i.e., deans) and exhibit idea generation, idea promotion, and idea realization as behavioral aspects of IWB. If organizational support systems are combined in this setting, it can significantly improve the effectiveness of leadership dynamics of

respect, and psychological safety for staff. Recognition of contributions, incentives, and involvement of university teachers can foster a resilient and innovative-centric workforce.

6. Theoretical Implications

This study contributes to the understanding of social exchange theory (Blau, 1964) in the academic setting of Turkish universities. In this sense, academic staff are highly likely to analyze the cost-benefit of their interactions with faculty deans while comparing their alternatives. Thus, when ethical leadership is applied, reciprocity can manifest as innovative behaviors in the workplace that are a necessity for conducting new research projects, dealing with unique student problems, and improving teaching styles. The current empirical evidence supports this argument and highlights the relevance of SET in this context, showing similarities to other regions as noted in the literature (e.g., Islam et al., 2024; Sarwar et al., 2020). Furthermore, the Turkish higher education dynamics require intrinsic motivation and the wellbeing of employees to be satisfied by the behaviors of faculty deans as ethical leaders. Self-determination theory (Deci & Ryan, 1985) is therefore highly relevant in this context (Ahmed Iqbal et al., 2020; Tsai, 2024).

This study supports the notion that provision of autonomy (power sharing), competence (ethical guidance), and relatedness (fairness, people orientation, and integrity) in academia can yield innovative behaviors that can benefit the teachers, students, and the overall performance of the university. With respect to organizational support theory (Eisenberger et al., 1986), when academic staff feel they are valued in the faculty and their contributions are recognized and rewarded, they are highly likely to develop self-enhancement, affiliation, and a positive response in their behaviors toward the organization. This significantly reduces the challenges of ethical leaders to establish trust and social bonds with the teachers to drive positive work outcomes (i.e., IWB) (Musenze & Mayende, 2023; Shafait & Huang, 2023). This implies that a cycle of support provided by the university and its leaders, along with teachers who are motivated and engaged with reciprocity, can be developed when ethical leaders are equipped with institutional support systems and cooperative human resource practices. In the emerging market context of Turkey, ethical leaders can foster relational, motivational, and value-centric faculty atmospheres where power is shared, teachers are involved in decision-making processes, treatment is fair, expectations are vivid, and the wellbeing of staff is genuinely cared for.

7. Practical Implications

The current results imply several practical implications that can be deployed by faculty deans in Turkey and other countries to improve the workplace for academic staff and drive positive behavioral and performance outcomes. In this respect, deans can leverage their powers to implement human resource practices that provide mental support, social groups, workshops, and academic or entertainment seminars for teachers with the help of human resources. Establishing such initiatives on a faculty scale enables the management of the university to optimize its resources and extend the activities to other faculties alike. Furthermore, ethical leadership can be a strategic implementation in human resources to attract, retain, and train individuals who can behave ethically and exhibit its characteristics. This strategic plan can yield long-term benefits for the university as an organizational unit as it integrates faculty approaches with visions and overall values of the university. From another perspective, these implementations foster the learning environment for students, improving the reputation and image of the university in the highly competitive market of education. Having reward systems and incentives for innovative work behavior in the faculty can also be used as a tool for deans to further encourage innovation among their staff. With the support of management, deans can share various tasks with the teachers,

providing them with autonomy. This can be combined with training and development programs to enhance their competence. Lastly, initiatives can be undertaken to create social groups (e.g., activities, workshops, casual meetings) to create connectedness and a sense of belonging. This further integrates the aforementioned human resource practices with the efforts of faculty deans to improve processes, the workplace, and the wellbeing of academic staff.

8. Limitations and Recommendations

Similar to every study, the current research is limited by a number of factors that are: (a) a limited sample size, which reduces generalizability, and can be addressed in future studies to expand the respondent pool; (b) a lack of assessment of changes in time which is a restriction of cross-sectional studies that future studies can bypass by employing longitudinal methodologies and designs to test the behavioral outcomes of academic staff prior and after certain supportive initiatives; (c) the Middle East and particularly Turkey is relatively less examined which reduces the comparativeness of the results, which future studies can tackle by exploring similar contexts in neighboring nations to provide cultural and social understanding of the subject at hand; (d) other theories, such as job demands-resources (due to high demands and limitations of the education setting), psychological empowerment theory (as a necessity for academic staffs engagement and innovative behaviors), and leader-member exchange theory (to further assess the role of ethical leaders) can be applied in this context to further shed light on the complexity of employee outcomes, particularly for academic staff; (e) self-reported quantitative surveys can have response biases that may skew the interpretation of findings, which qualitative studies can be conducted to provide a more in-depth understanding; and (f) cultural norms, political and regulatory systems, and economic funding and stability are other aspects that can be important organizational elements aiding the efforts of leaders. These limitations can be addressed by scholars in future studies to build upon current findings and contribute to the understanding of ethical leadership dynamics in academia.

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Appendix A. Questionnaire

Construct	Dimension	Item	Question
Ethical Leadership	Fairness	EL1	My supervisor treats everyone fairly.
		EL2	My supervisor makes fair and balanced decisions.
		EL3	My supervisor avoids favoritism.

Construct	Dimension	Item	Question
	Power Sharing	EL4	My supervisor encourages employees to voice their opinions.
		EL5	My supervisor consults employees when making decisions.
		EL6	My supervisor allows subordinates to influence critical decisions.
	Role Clarification	EL7	My supervisor communicates expectations clearly.
		EL8	My supervisor explains how job roles contribute to the overall goals.
		EL9	My supervisor provides guidance on how to perform tasks.
	People Orientation	EL10	My supervisor shows concern for others' needs and wellbeing.
		EL11	My supervisor helps subordinates with personal problems.
		EL12	My supervisor supports employee development.
	Integrity	EL13	My supervisor acts consistently with the values he/she promotes.
		EL14	My supervisor keeps his/her promises.
		EL15	My supervisor is honest and trustworthy.
	Ethical Guidance	EL16	My supervisor sets a good example of ethical behavior.
		EL17	My supervisor explains the ethical rules and principles.
		EL18	My supervisor defines success not just by results but also by the way they are obtained.
Work Engagement	Vigor	WE1	I feel full of energy at my job.
		WE2	At my work, I feel strong and vigorous.
		WE3	I can continue working for long periods of time without getting tired.
	Dedication	WE4	I am enthusiastic about my job.
		WE5	My job inspires me.
		WE6	I am proud of the work that I do.
	Absorption	WE7	I get carried away when I'm working.
		WE8	Time flies when I'm working.
		WE9	I am immersed in my work.
Innovative Work Behavior	Idea Generation	IWB1	I generate original solutions for problems at work.
		IWB2	I come up with new ideas to improve performance.
		IWB3	I regularly suggest new approaches to tasks.
	Idea Promotion	IWB4	I attempt to gain support for innovative ideas.
		IWB5	I promote new ideas to colleagues.
		IWB6	I try to convince others of the value of new ideas.
	Idea Realization	IWB7	I transform innovative ideas into practical applications.
		IWB8	I make efforts to implement new ideas at work.
		IWB9	I contribute to turning creative ideas into useful outcomes.
Perceived Organizational Support	-	POS1	My organization values my contributions.
		POS2	My organization cares about my wellbeing.
		POS3	My organization supports me when I have a problem.
		POS4	My organization appreciates extra effort from me.
		POS5	My organization would forgive an honest mistake.

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Article

From Info Seeker to Startup Superhero: How Information Literacy Influences Entrepreneurial Intention and Skills Among Business Students

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Abstract: This study examined the effects of information literacy (IL) on entrepreneurial intention and entrepreneurial skills among business students in Sargodha, Pakistan. A quantitative research design was employed along with a survey method. The data were gathered using a structured and self-administered questionnaire to collect data from a sample of 277 students, recruited through a convenient sampling process. Data analysis involved the application of descriptive and inferential statistics in SPSS (Version 21). The results suggested that the business students' IL levels were not optimal, with no significant differences noted based on age, gender, semester, and academic disciplines. However, IL skills showed a positive correlation with students' CGPA. The results also showed that IL had a positive effect on entrepreneurial intentions and entrepreneurial skills. In essence, students with higher levels of IL tended to exhibit better entrepreneurial intention and skills compared to those with lower IL levels. These results inform educators and policymakers in shaping policies and practices for business education in general and entrepreneurial education in particular. This research would be a valuable addition to the existing body of knowledge on IL research in the context of academia in general and business and entrepreneurial education in particular, as a limited number of studies have appeared in the existing literature.

Keywords: information literacy; entrepreneurial intention; entrepreneurial skills; academic achievement; business students; Pakistan

1. Introduction

Information literacy (IL), recognized as a paramount and transformative force in education (Bruce, 2004; Majid et al., 2020; Naveed et al., 2023a), equips individuals with the ability to identify their information needs, locate, assess, and ethically apply pertinent information to specific situations (Association of College and Research Libraries, 2000; Foo et al., 2017; Shipman et al., 2009). IL refers to a meta-literacy that involves a range of skills, including information seeking, retrieval, evaluation, management, reuse, and communication, regardless of the information's genre or medium (Machin-Mastromatteo, 2021). It

empowers individuals with the capacity for critical thinking, informed perspectives, and well-balanced judgments regarding the information they encounter and utilize, fostering comprehensive societal engagement (Chartered Institute of Library & Information Professionals, 2018). The enhancement of students' proficiency in handling information-related tasks, optimizing information utilization, and adopting appropriate information behaviors is boosted by their IL levels (Naveed & Mahmood, 2022). IL not only improves students' academic involvement and performance (Banik & Kumar, 2019; Jones & Mastrorilli, 2022; Mughari et al., 2023) but also contributes to the development of students as lifelong learners and creative professionals (Naveed et al., 2023b; Naveed & Mahmood, 2019; Saadia & Naveed, 2024).

The dynamic nature of modern enterprises calls for a workforce that must stay abreast of recent technological advancements to solve business problems innovatively (London, 2011) and maintain a sustainable competitive advantage (Kesici, 2022). Consequently, students are urged to foster skills for lifelong learning—an autonomous, voluntary, and continuous pursuit of knowledge to keep pace with technological developments and enhance organizational performance and effectiveness (Coşkun & Demirel, 2010; Dweck, 2016; Naveed et al., 2023a, 2023b). In the context of entrepreneurship, IL is crucial for decision-making and problem-solving, as entrepreneurs often need to stay updated on market trends, technological advancements, and competitive information (Syam et al., 2021). The entrepreneurial process involves environmental scanning for opportunities, assessing risks, and making strategic decisions that require extensive research and gathering of credible information (Cardella et al., 2020; Pascucci et al., 2024; Pryor et al., 2016). IL not only equips entrepreneurs with the critical thinking and analytical skills needed to navigate the complexities of entrepreneurship (e.g., finding credible information, staying informed, making balanced judgments, etc.) but also enables them to stay updated and make informed decisions and contributes to shaping a positive entrepreneurial intention (Syam et al., 2021) and the development of entrepreneurial skills (Korani, 2022; Mohammadinejad & Tirgar, 2023).

Information-literate entrepreneurs may feel more confident and prepared to embark on entrepreneurial ventures (Bahrami & Jafariharandi, 2020; Keshavarz, 2021). On the other hand, the increasing engagement in entrepreneurial activities can also enhance and intensify levels of IL. Thus, the nature of the relationship between IL, entrepreneurial intention, and skills is symbiotic, with each reinforcing and complementing the other. The practical application of IL skills in real-world business scenarios not only can deepen one's understanding and proficiency but also may serve as a crucial groundwork for gaining and employing the skills essential for success in entrepreneurship. Determining the factors influencing entrepreneurial intention and skills has always been crucial for those involved in entrepreneurial education, aiming to bolster the potential for successful startup ventures (Al-Qadasi et al., 2024; Hou et al., 2023; Kurjono et al., 2023). Launching a business relies heavily on information utilization, demanding the capability to efficiently locate, assess, and apply information (Pryor et al., 2016). Therefore, it is alleged that IL should positively influence entrepreneurial intention and skills. In comparison, some studies have explored the relationship between IL and entrepreneurial intention (Syam et al., 2021) and entrepreneurial skills (Korani, 2022; Mohammadinejad & Tirgar, 2023).

Evidence regarding the interconnectedness of IL, entrepreneurial intention, and skills remains limited. Moreover, research specifically examining the association between IL, entrepreneurial intention, and entrepreneurial skills among business students is scarce, with no studies appearing to address this area directly. Therefore, this study intends to examine the influence of IL on entrepreneurial intention and skills among business students in the District of Sargodha, Pakistan. A deeper understanding of these interrelationships may not only enhance recognition of the effectiveness of IL in business education but

also inform policy and practice for business and entrepreneurial education. Specifically, examining the interplay between IL, entrepreneurial intention, and entrepreneurial skills offers pragmatic insights into the IL significance for business education, thereby enabling educators and policymakers to design more effective curricula for fostering entrepreneurial endeavors. The present research seeks to address the following research questions (RQ):

RQ 1: What is the nature of the association between information literacy, entrepreneurial intentions, and skills?

RQ 2: How does information literacy influence entrepreneurial intentions among business students?

RQ 3: How does information literacy influence entrepreneurial skills among business students?

2. Literature Review and Hypotheses Development

There is a sizable body of research addressing IL in various ways and contexts (e.g., academia, workplace, health, and everyday life) both nationally and internationally (e.g., Atikuzzaman et al., 2025; Naveed et al., 2023a, 2023b). Some studies appear to have been conducted to assess IL skills among business students (e.g., Naveed & Mahmood, 2019, 2022). The following paragraphs review the related literature, specifically focusing on the interrelationships between IL, entrepreneurial intention, and entrepreneurial skills.

2.1. Information Literacy and Entrepreneurial Intentions

Entrepreneurial intention refers to one's conscious and purposeful choice to engage in entrepreneurial pursuits (Thompson, 2009). It reflects an inclination and commitment of a person to initiate and manage independent business ventures (Esfandiar et al., 2019). It encompasses the cognitive process of identifying business opportunities, assessing risks and rewards, and making a deliberative decision to embark on an entrepreneurial path. This process requires credible information for making informed and competitive decisions, generating business value. In this regard, IL is strongly connected to the development and sustenance of an entrepreneurial mindset capable of initiating entrepreneurial ventures (Bosman et al., 2023). Scholars have highlighted the positive role of IL in environmental scanning to identify business opportunities (e.g., Zhang et al., 2010a).

Entrepreneurs with advanced IL skills are better positioned to assimilate diverse sources of information, fostering a continuous learning orientation, and demonstrate a heightened capacity to recognize gaps in the market and to formulate innovative strategies (Bae et al., 2014; Foo et al., 2012). Additionally, IL influence on decision-making and risk management has also been emphasized, with research indicating that entrepreneurs with strong IL skills are better equipped to make informed choices and navigate uncertainties in the business environment (Zhang et al., 2010b, 2014). This relationship also extends to the fostering of creativity and innovation within entrepreneurial endeavors, as IL-proficient individuals can leverage diverse information sources to stimulate novel ideas (Naveed et al., 2023a, 2023b; Saadia & Naveed, 2024; Wu, 2019). The connection between IL and the entrepreneurial intention is symbiotic, with IL catalyzing the development and reinforcement of entrepreneurial attitudes and behaviors. Some studies also provided empirical evidence for the integral role of digital literacy, an element of IL, in shaping entrepreneurial intentions (e.g., Hutagalung et al., 2023; Nugroho et al., 2023; Onwubuya & Odogwu, 2023). However, only a few inquiries provided empirical evidence for a positive role of IL in shaping entrepreneurial intentions (e.g., Syam et al., 2021). However, the study of Abaddi (2024) reported a negative correlation between digital skills and entrepreneurial intentions of undergraduate university students in Jordan. There is still a lack of evidence about the interconnection between IL and entrepreneurial intentions. Furthermore, the

results of existing studies also needed to be corroborated with varied samples from different geographical locations for theorization. Hence, the first research hypothesis was framed as given below:

H₁: *Information literacy skills of business students positively influence their entrepreneurial intentions.*

2.2. Information Literacy and Entrepreneurial Skills

Entrepreneurial skills refer to the ability to identify opportunities, innovate, take calculated risks, and effectively launch, manage, and grow successful ventures. Entrepreneurial pursuits require ambition as fuel, but IL and entrepreneurial skills are also essential to navigate the ever-changing landscape. Even though they are distinct in character, they intertwine and empower people to transform their aspirations into ventures. IL serves as a compass, empowering individuals to find credible information and equipping them in the identification of market opportunities, making strategic choices, and forging a valuable business network (Solihin, 2023; Chris-Israel et al., 2022; Suryani & Chaniago, 2023). On the other hand, entrepreneurial skills are a toolkit of action-oriented abilities to conduct comprehensive market research, understand industry dynamics, identify lucrative opportunities, and take calculated risks (Baldan & Hermawan, 2024; Ndofirepi, 2024; Saleh et al., 2024). The synergy between these two sets of skills is potent. IL empowers individuals with knowledge and direction, while entrepreneurial skills translate that knowledge into action. Therefore, the relationship between IL and entrepreneurial skills is synergistic, with one catalyzing the other, contributing significantly to the success and adaptability of entrepreneurs in a dynamic business landscape of the 21st century. The empirical evidence for this mutually reinforcing relationship was also provided by a few studies (e.g., Mohammadinejad & Tirgar, 2023; Tatari & Mokhtari Dinani, 2018). More empirical evidence is still awaited using varied units of analysis from different geographical locations. Thus, the second research hypothesis was articulated as follows:

H₂: *Information Literacy skills of business students positively influence their entrepreneurial skills.*

In view of the above discussion, IL, entrepreneurial intentions and entrepreneurial skills are considered essential for startups and successful business ventures. Despite the crucial role of such skills, a relatively limited number of empirical studies have appeared so far to support a correlation between these constructs, especially among business students. There is a need for more empirical evidence for theorizing point of view about direct and positive IL influence on entrepreneurial intention and skills.

3. Research Methodology

3.1. Research Model

This research primarily investigated the interrelations between IL, entrepreneurial intention and entrepreneurial skills using business students from the District of Sargodha, Pakistan. The following research model was proposed to depict the expected interrelationships between these constructs (Figure 1).

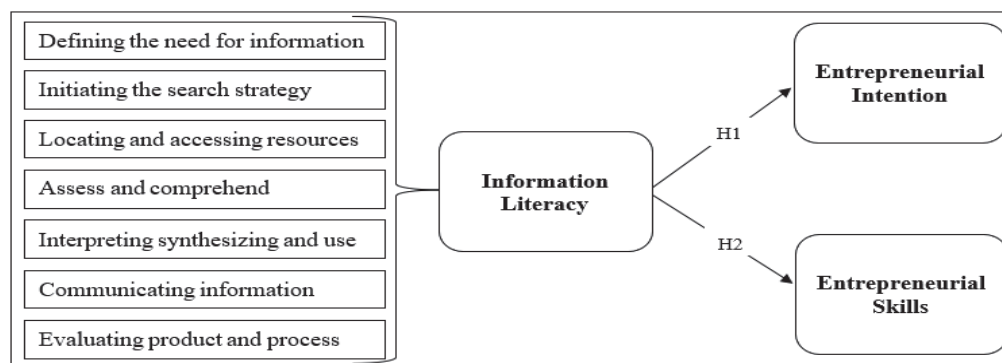


Figure 1. Proposed research model.

3.2. Research Design and Method

A quantitative research approach utilizing a survey method was adopted for this study, with the aim of exploring the impact of IL on entrepreneurial intentions and skills among business students in Sargodha, Pakistan. Creswell (Creswell & Creswell, 2017) stated that a quantitative research approach is well-suited for assessing the beliefs, behaviors, and attitudes of individuals towards specific phenomena. Similar research designs have been employed in prior studies investigating IL among business students (e.g., Naveed & Mahmood, 2019, 2022).

3.3. Instrumentation

The study used the questionnaire as a data collection instrument. The questionnaire consisted of two sections, namely, the demographic section and the research variables section, such as IL literacy, entrepreneurial intention, and entrepreneurial skills. The scales to measure these research variables were adopted from the existing literature. The IL statements (28 in total) were sourced from the work of Kurbanoglu et al. (2006) and rated on a seven-point Likert scale (7 = almost always true, 6 = usually true, 5 = often true, 4 = occasionally true, 3 = sometimes but infrequently true, 2 = usually not true, 1 = almost never true). Meanwhile, entrepreneurial intention was evaluated using the scale developed by Liñán and Chen (2009), comprising six items, and entrepreneurial skills were assessed using the scale developed by Liñán (2008), also consisting of six statements. Each statement related to entrepreneurial intention and skills was rated on a five-point Likert scale (e.g., 5 = Strongly agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1 = Strongly Disagree). These scales were selected due to their widespread use in measuring IL, entrepreneurial intention, and entrepreneurial skills and their reported reliability and validity in existing literature (e.g., Kurbanoglu et al., 2006; Liñán, 2008; Liñán & Chen, 2009).

The initial version of the questionnaire underwent scrutiny by a panel of experts to assess its face and content validity, leading to revisions as necessary. The demographic section of the questionnaire encompassed aspects such as gender, age, program, and CGPA. The subsequent section of the questionnaire addressed the research inquiries concerning IL, entrepreneurial intentions, and entrepreneurial skills. Utilizing data from the present study, Cronbach's alpha, a metric for gauging internal consistency, was employed to assess the reliability of the statements of IL, entrepreneurial intention, and entrepreneurial skills. The findings revealed that the measures utilized, including information literacy (28 items, CA = 0.861), entrepreneurial intentions (6 items, CA = 0.709), and entrepreneurial skills (6 items, CA = 0.656), demonstrated satisfactory levels of internal reliability, as indicated by their acceptable Cronbach's alpha values.

3.4. Population and Sampling

The business students from the University of Lahore's (Sargodha campus) and the University of Sargodha's Noon Business School were considered as the population for this study. The size of the population was about 1093 students who enrolled in the universities of district Sargodha. The sample size was obtained using Yamane's Formula $n = N / (1 + N(e)^2)$, where $e = 0.05$. Applying the method, the sample size of 292 represented the entire population of 1093. The recruitment of the survey participants was made through a convenience sampling technique, as it is indeed an ideal method for choosing participants who are easily available at the moment of data collection (Gay et al., 2012). Although random sampling methods are the best option for unbiased samples, it was challenging for researchers to choose samples at random due to no access to a comprehensive list of business students and time limitations.

3.5. Data Collection and Analysis

The questionnaires were personally distributed to the survey participants by visiting their classrooms after getting approval from the academic heads. The survey questionnaires were distributed to participants during regular university hours. The process of data collection was completed in one to two months. The participation in the survey was voluntary. The involvement of humans as survey participants was cleared and approved by the ethical review board of the institution. A total of 277 responses were obtained, representing a response rate of 94%. After gathering data from the participants, the questionnaire was coded into an SPSS data sheet. Utilizing SPSS, descriptive statistics such as frequency, percentages, mean, and standard deviations were computed, alongside inferential statistics including Pearson correlation, independent samples *t*-test, one-way ANOVA, and simple linear regressions for data analysis.

4. Results

4.1. Participants' Demographic Characteristics

Table 1 presented the demographic profile of the respondents. Of the 277 survey participants, there were 152 (54.9%) males and 125 (45.1%) females. The age range of survey participants spanned from 18 to 30 years. The majority of respondents ($n = 192$, 69.3%) fell within the age group of 21–25 years, with smaller proportions comprising those aged up to 20 years ($n = 72$, 25.9%) and over 26 years ($n = 13$, 4.7%). Additionally, a significant majority of participants ($n = 258$, 93.1%) were enrolled in 16-year programs (BS/MA), followed by MS/MPhil programs ($n = 19$, 6.9%). As far as their Cumulative Grade Point Average (CGPA) is concerned, most of these respondents ($n = 157$, 56.7%) scored a CGPA greater than 3.0, followed by those who scored a CGPA between 2.5 and 3.0 ($n = 97$, 35%) and up to 2.5 ($n = 23$, 8.3%).

Table 1. Demographic characteristics of the survey participants ($n = 277$).

Sample Characteristics	Category	Frequency	Percentage (%)
1. Gender	Male	152	54.9
	Female	125	45.1
2. Age	Up to 20 years	72	25.9
	21–25 years	192	69.3
	26+ years	13	4.7
3. Program	BS/MBA (16 years)	258	93.1
	MS/MPhil (18 years)	19	6.9
	Up to 2.5	23	8.3
4. CGPA	2.6–3.0	97	35.0
	3.0+	157	56.7

4.2. Relationship of IL Skills, Entrepreneurial Intention, and Entrepreneurial Skills with Personal and Academic Variables

Various statistical tests were employed to examine the association of IL skills, entrepreneurial intention, and entrepreneurial skills with personal factors among business students. The findings of these analyses are summarized in Table 2. The results revealed no statistically significant relationship of IL skills, entrepreneurial intention, and entrepreneurial skills with personal or academic variables such as age, gender, and program of study ($p > 0.05$). However, there was a statistically significant and positive correlation observed between the IL skills of business students and their CGPA ($p < 0.05$). This suggests that an increase in the IL skills of business students corresponds to an increase in their CGPA.

Table 2. Correlations of IL skills, entrepreneurial intention, and skills with personal variables.

Variables	Statistics	Information Literacy		Entrepreneurial Intention		Entrepreneurial Skills	
		Value	Sig.	Value	Sig.	Value	Sig.
Age	Pearson Correlation	0.061	0.314	−0.056	0.357	−0.090	0.135
Gender	<i>t</i> -test	1.096	0.278	1.087	0.278	1.035	0.301
CGPA	Pearson Correlation	0.641	0.028 *	−0.059	0.332	−0.067	0.267
Program	<i>t</i> -test	0.871	0.385	1.564	0.119	1.230	0.220

* $p < 0.05$.

4.3. Relationship of IL with Entrepreneurial Intentions and Entrepreneurial Skills

The Pearson correlation coefficient was computed to ascertain the nature of the relationship between information literacy, entrepreneurial intention, and entrepreneurial skills. Table 3 provided a detailed overview of these results. The data indicated a statistically significant and positive correlation between information literacy and its components with entrepreneurial intention and entrepreneurial skills among the business students. The strength of the relationship of each component of IL with entrepreneurial intention and entrepreneurial skills ranged from moderate to large, as per the criteria suggested by Cohen (1988, 1992) for social sciences. However, there were substantial associations observed between overall IL skills and entrepreneurial intention, as well as entrepreneurial skills. Consequently, a simple linear regression analysis could be conducted to assess the impact of IL on entrepreneurial intention and entrepreneurial skills.

Table 3. Correlation analysis.

S#	Variables	Entrepreneurial Intention		Entrepreneurial Skills	
		Pearson Correlation	Sig.	Pearson Correlation	Sig.
1	Defining the need for information	0.265 **	0.000	0.279 **	0.000
2	Initiating the search strategy	0.265 **	0.000	0.279 **	0.000
3	Locating and accessing the resources	0.514 **	0.000	0.548 **	0.000
4	Assessing and comprehending information	0.430 **	0.000	0.458 **	0.000
5	Interpreting, synthesizing, and using information	0.161 **	0.000	0.269 **	0.000
6	Communicating information	0.367 **	0.000	0.418 **	0.000
7	Evaluating the product and process	0.288 **	0.000	0.232 **	0.000
8	ILSES (overall Scale)	0.525 **	0.000	0.525 **	0.000

** correlation is significant at 0.01; Cohen' criterion for relationship strength: $r \leq 0.10 = \text{small}$; $0.10 \leq r \leq 0.30 = \text{moderate}$; $0.30 \leq r \leq 0.50 = \text{large}$.

4.4. Effect of IL on Entrepreneurial Intentions and Entrepreneurial Skills

4.4.1. Effect of IL on Entrepreneurial Intention

Several simple linear regression analyses were conducted to assess the influence of IL and its components on entrepreneurial intention among business students. The detailed outcomes of these analyses are presented in Table 4. Each of the eight models in Table 4 will be discussed individually in the subsequent paragraphs.

Table 4. Regression analysis: information literacy on entrepreneurial intention.

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	F	Sig ^b	R ²	Remarks
		B	Std. Error	Beta (β)						
1	(Constant)	2.710	0.239		11.350	0.000				
	Defining the need for information	0.216	0.047	0.265	4.560	0.000	20.797	0.000 ^b	0.070	Supported
2	(Constant)	2.811	0.219		12.351	0.000				
	Initiating the search strategy	0.315	0.045	0.391	5.571	0.000	23.391	0.000 ^b	0.279	Supported
3	(Constant)	1.811	0.202		8.959	0.000				
	Locating and accessing the resources	0.405	0.041	0.514	9.926	0.000	98.528	0.000 ^b	0.264	Supported
4	(Constant)	2.235	0.200		11.190	0.000				
	Assessing and comprehending information	0.322	0.041	0.430	7.905	0.000	62.495	0.000 ^b	0.185	Supported
5	(Constant)	3.240	0.204		15.865	0.000				
	Interpreting, synthesizing, and using information	0.105	0.039	0.161	2.713	0.007	7.361	0.007 ^b	0.026	Supported
6	(Constant)	2.428	0.211		11.501	0.000				
	Communicating information	0.283	0.043	0.367	6.540	0.000	42.778	0.000 ^b	0.135	Supported
7	(Constant)	2.962	0.170		17.455	0.000				
	Evaluating the product and process	0.168	0.034	0.288	4.990	0.000	24.899	0.000 ^b	0.083	Supported
8	(Constant)	1.141	0.261		4.366	0.000				
	ILSES (Overall Scale)	0.542	0.053	0.525	10.217	0.000	104.396	0.000 ^b	0.275	Supported

^b independent variable: information literacy.

Model 1: Defining the need for information (Component 1) on entrepreneurial intention. A simple linear regression analysis was conducted to predict entrepreneurial intention based on the first component of IL, namely, ‘defining the need for information’. They showed a significant regression equation [$F(277) = 20.797$, $p = 0.000$, $R^2 = 0.070$]. According to Table 4, ‘defining the need for information’ was a statistically significant and favorable component predicting the entrepreneurial intention among business students ($\beta = 0.265$, $p = 0.000 < 0.05$).

Model 2: Initiating the search strategy (Component 2) on entrepreneurial intention. A simple linear regression analysis was done to predict entrepreneurial intention based

on the second component, tagged as ‘initiating the search strategy’, which revealed a significant regression equation [$F(277) = 23.391, p = 0.000, R^2 = 0.279$]. ‘Initiating the search strategy’ was a significant and favorably predictive factor of entrepreneurial intention among university students, as shown in Table 4 ($\beta = 0.391, p = 0.000 < 0.05$).

Model 3: Locating and accessing the resources (Component 3) on entrepreneurial intention. Table 4 also indicated a statistically significant regression equation [$F(277) = 98.528, p = 0.000, R^2 = 0.264$] to predict entrepreneurial intention based on the third component, such as ‘locating and accessing information’. Locating and accessing information also appeared to be a statistically significant predictor of entrepreneurial intention among business students ($\beta = 0.514, p = 0.000 < 0.05$).

Model 4: Assessing and comprehending information (Component 4) on entrepreneurial intention. A statistically significant regression equation [$F(277) = 62.495, p = 0.000, R^2 = 0.185$] also appeared for entrepreneurial intention based on the fourth component, namely, ‘assessing and comprehending information’ (Table 4). ‘Assessing and comprehending information’ ($\beta = 0.430, p = 0.000 < 0.05$) also appeared to be a statistically significant predictor of entrepreneurial intention among business students.

Model 5: Interpreting, synthesizing, and using information (Component 5) on entrepreneurial intention. The figures in Table 4 also showed a statistically significant regression equation [$F(277) = 7.361, p = 0.000, R^2 = 0.026$] for entrepreneurial intention based on ‘interpreting, synthesizing, and using information’. The fifth component, such as ‘interpreting, synthesizing, and utilizing information,’ also appeared to predict entrepreneurial intention statistically among these business students ($\beta = 0.161, p = 0.000 < 0.05$).

Model 6: Communicating information (Component 6) on entrepreneurial intention. Table 4 also showed a statistically significant regression equation [$F(277) = 42.778, p = 0.000, R^2 = 0.135$] for entrepreneurial intention based on ‘communicating information’. ‘Communicating information’ also appeared as a statistically significant and favorable predictor for entrepreneurial intention. ($\beta = 0.367, p = 0.000 < 0.05$).

Model 7: Evaluating the product and process (Component 7) on entrepreneurial intention. A simple linear regression analysis was also carried out to predict entrepreneurial intention based on ‘evaluating the product and process’. The findings showed a significant regression equation ($F(277) = 24.899, p = 0.000$), with an R^2 of 0.083 (Table 4). ‘Evaluating the product and process’ was a strong predictor of entrepreneurial intention among business students ($\beta = 0.288, p = 0.000 < 0.05$).

Model 8: Effect of IL skills (overall scale) on entrepreneurial intention. The figures in Table 4 also indicated a statistically significant regression equation ($F(277) = 104.396, p = 0.000$), with an R^2 of 0.275 to predict entrepreneurial intention based on overall IL skills. IL skills of business students appeared as a statistically significant predictor of entrepreneurial intention among business students ($\beta = 0.525, p = 0.000 < 0.05$).

Based on the results in Table 4, which show a positive relationship between overall IL scores and entrepreneurial intention, we can confirm that information literacy (IL) positively influences entrepreneurial intention among business students. This finding supports our research hypothesis (H1).

4.4.2. Effect of IL on Entrepreneurial Skills

Simple linear regression analyses were also conducted to examine the effect of IL and each of its sub-dimensions on entrepreneurial skills among business students. The detailed results of these analyses are provided in Table 5.

Table 5. Regression analysis: information literacy on entrepreneurial skills.

	Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	F	Sig ^b	R ²	Remarks
		B	Std. Error	Beta (β)						
1	(Constant)	2.814	0.209		13.470	0.000				
	Defining the need for information	0.200	0.041	0.279	4.826	0.000	23.288	0.000 ^b	0.078	Supported
2	(Constant)	2.311	0.219		12.471	0.000				
	Initiating the search strategy	0.211	0.039	0.387	5.922	0.000	21.389	0.000 ^b	0.271	Supported
3	(Constant)	1.957	0.173		11.308	0.000				
	Locating and accessing the resources	0.380	0.035	0.548	10.878	0.000	118.323	0.000 ^b	0.301	Supported
4	(Constant)	2.361	0.173		13.660	0.000				
	Assessing and comprehending information	0.301	0.035	0.458	8.533	0.000	72.813	0.000 ^b	0.209	Supported
5	(Constant)	3.014	0.175		17.213	0.000				
	Interpreting, synthesizing, and using information	0.153	0.033	0.269	4.631	0.000	21.444	0.000 ^b	0.072	Supported
6	(Constant)	2.452	0.181		13.536	0.000				
	Communicating information	0.283	0.037	0.418	7.625	0.000	58.140	0.000 ^b	0.175	Supported
7	(Constant)	3.227	0.151		21.306	0.000				
	Evaluating the product and process	0.119	0.030	0.232	3.948	0.000	15.585	0.000 ^b	0.054	Supported
8	(Constant)	1.289	0.222		5.813	0.000				
	ILSES (Overall Scale)	0.517	0.045	0.569	11.478	0.000	131.755	0.000 ^b	0.324	Supported

^b independent variable: information literacy.

Model 1: Defining the need for information (Factor 1) on entrepreneurial skills. The figures in Table 5 revealed a statistically significant regression equation [F (277) = 23.288, $p = 0.000$] with an R² of 0.078 to predict entrepreneurial skills based on factor 1, namely, ‘defining the need for information’. ‘Defining the need for information’ also appeared to be a statistically significant and favorable predictor of entrepreneurial skills among business students ($\beta = 0.514$, $p = 0.000 < 0.05$).

Model 2: Initiating the search strategy (Factor 2) on entrepreneurial skills. A statistically significant regression equation [F (277) = 21.389, $p = 0.000$, R² = 0.271] also appeared for entrepreneurial intention based on the second factor of information literacy, namely, ‘initiating the search strategy’ (Table 5). These figures also showed that ‘initiating the search strategy’ was a statistically significant and positive predictor of business students’ entrepreneurial skills ($\beta = 0.387$, $p = 0.000 < 0.05$).

Model 3: Locating and accessing the resources (Factor 3) on entrepreneurial skills. The results of a simple linear regression analysis in Table 4 for entrepreneurial skills based on the third factor, namely, ‘Locating and accessing the resources’, also showed a statistically significant regression equation [F (277) = 118.323, $p = 0.000$, R² = 0.301].

The third factor of information literacy also appeared to predict the entrepreneurial skills ($\beta = 0.548, p = 0.000 < 0.05$).

Model 4: Assessing and comprehending information (Factor 4) on entrepreneurial skills. The results in Table 5 showed a significant regression equation ($F(277) = 72.813, p = 0.000$), with an R^2 of 0.209 for entrepreneurial skills based on the fourth factor, namely, ‘assessing and comprehending information’. This factor also predicted favorably the entrepreneurial skill of business students ($\beta = 0.458, p = 0.005 < 0.05$).

Model 5: Interpreting, synthesizing, and using information (Factor 5) on entrepreneurial skills. Table 5 also showed a significant regression equation ($F(277) = 21.444, p = 0.000$), with an R^2 of 0.072, for business students’ entrepreneurial skills based on the fifth IL factor labeled as ‘interpreting, synthesizing, and using information’. The results also showed ‘interpreting, synthesizing, and using information’ as a statistically significant predictor of entrepreneurial skills ($\beta = 0.269, p = 0.000 < 0.05$).

Model 6: Communicating Information (Factor 6) on entrepreneurial skills. There was a statistically significant regression equation [$F(277) = 58.140, p = 0.000, R^2 = 0.175$] for entrepreneurial capabilities of university students based on the 6th IL factor, namely, ‘communicating information’ (Table 5). ‘Communicate information’ also appeared as a statistically significant predictor of business students’ entrepreneurial skills ($\beta = 0.418, p = 0.000 < 0.05$).

Model 7: Evaluating the product and process (Factor 7) on entrepreneurial skills. A simple linear regression analysis was conducted to predict entrepreneurial skills based on the seventh factor labeled ‘evaluating the product and process’ (Table 5). The results indicated a statistically significant regression equation [$F(277) = 15.585, p < 0.001$]. ‘Evaluating the product and process’ emerged as a significant predictor of entrepreneurial skills ($\beta = 0.232, p < 0.001$).

Model 8: Effect of IL Skills (overall scale) on entrepreneurial skills. Table 5 also indicated a statistically significant regression equation [$F(277) = 131.755, p = 0.000, R^2 = 0.324$] to predict entrepreneurial skills based on overall IL skills. IL skills of business students appeared as a statistically significant predictor of entrepreneurial skills among business students ($\beta = 0.569, p = 0.000, 0.05$).

Examining the figures presented in Table 5, it is reasonable to assert that there is a positive effect of IL on entrepreneurial skills in business students. Consequently, the research hypothesis is supported.

5. Discussion

The primary objective of the proposed research was to investigate the effect of IL on entrepreneurial intention and entrepreneurial skills among business students in the Sargodha district of Pakistan, using a cross-sectional survey approach. The findings revealed that these business students did not possess an optimal level of IL, as they tended to rate themselves as occasionally true to often true for IL statements. This outcome was expected due to the absence of an effective IL instruction program in the selected universities. The current state of IL instruction programs in university libraries in Pakistan is still in its early stages, offering only basic levels of IL instruction (Anwar & Naveed, 2019; Hamid & Ahmad, 2016; Kousar & Mahmood, 2015; Naveed & Mahmood, 2019, 2022; Ullah & Ameen, 2014). These findings align with previous studies, which also reported that the IL self-efficacy of business students was not at an optimal level, as they were less comfortable with advanced IL skills (Naveed & Mahmood, 2019, 2022).

The results also showed IL as the predictor of entrepreneurial intention. This finding was expected, as the ability to find, access, and use the needed information can contribute to the development of entrepreneurial intentions. Several research scholars have emphasized

the positive role of IL in effective environmental scanning and recognition of business opportunities (Zhang et al., 2010a), identification of market gaps and formulation of innovative strategies (Bae et al., 2014; Foo et al., 2012) and evidence-based decision making and risk management (Zhang et al., 2010b, 2014). The intricate nature of the relationship between IL and the entrepreneurial intention appears to be symbiotic, where IL plays a catalytic role for the development and reinforcement of entrepreneurial intentions. This finding appeared to be in line with that of Syam et al. (2021) who also reported IL as a predictor of entrepreneurial intentions and corroborated the results of some other existing studies providing empirical evidence for a positive role of digital literacy, an IL element, in the development of entrepreneurial intentions (e.g., Hutagalung et al., 2023; Nugroho et al., 2023; Onwubuya & Odogwu, 2023). However, this finding contrasts with the results of Abaddi (2024), who reported an inverse relationship between digital skills and entrepreneurial intentions among undergraduate students in Jordanian universities.

A closer look at the results also revealed IL as a positive predictor of entrepreneurial skills.

These results were also expected, as the entrepreneurial process requires the information capabilities of efficient and effective environmental scanning, conducting marketing research, understanding market dynamics, recognizing lucrative business opportunities, developing entrepreneurial ventures, developing a business network, and achieving a sustainable competitive advantage (Baldan & Hermawan, 2024; Chris-Israel et al., 2022; Ndofirepi, 2024; Saleh et al., 2024; Solihin, 2023; Suryani & Chaniago, 2023). This finding corroborated the results of a few other previous studies reporting the positive effects of IL on entrepreneurial skills (e.g., Esmaeil Pounaki et al., 2016; Mokhtari Dinani & Tatari, 2018; Zardoshtian et al., 2018). Likewise, Mohammadinejad and Tirgar (2023) also reported a positive relationship of IL with entrepreneurial capabilities among students of technical art schools at Kerman, Iran. Another study from Iran by Tatari and Mokhtari Dinani (2018) reported a positive effect of IL on the entrepreneurial capability of physical education students at Tehran state universities in Iran.

6. Conclusions and Implications

Several conclusions can be derived from these findings. Firstly, there remains a need for improvement in the IL skills of business students, as they assessed themselves as often true to usually true for IL statements. Secondly, IL also exhibited a statistically significant but positive correlation with academic achievement. Thirdly, there was a positive and statistically significant correlation observed between IL, entrepreneurial intention, and entrepreneurial skills. Lastly, IL also appeared to have a positive effect on entrepreneurial intention and entrepreneurial skills. In other words, IL exerted a positive influence on both entrepreneurial intention and entrepreneurial skills. Lastly, IL also exhibited a positive correlation with academic achievement.

These findings carry both theoretical and practical implications. From a theoretical standpoint, this study provided empirical evidence for IL as a predictor of entrepreneurial intentions and entrepreneurial skills, contributing to the theoretical understanding of the factors that foster entrepreneurial development. Moreover, these results provide pragmatic insight into IL effectiveness for business education, suggesting IL as a critical component rather than a general academic skill that contributes to specific professional outcomes like entrepreneurial success. These findings also demonstrated a positive correlation between IL and entrepreneurial intention and entrepreneurial skills, suggesting that future theoretical models of entrepreneurial development should explicitly incorporate IL as a significant antecedent or moderating variable. Furthermore, the replication of a positive correlation between IL and academic achievement reinforces existing theories about the broader

benefits of IL in educational contexts. Although these results needed to be corroborated for generalization, they still have a significant contribution to the existing IL literature.

In terms of practical implications, this newfound knowledge can guide educators and policymakers in developing strategies to better equip students with the IL skills needed to thrive in business and entrepreneurship. These findings offer insights for policies and practices about business education in general and entrepreneurial education in particular, as these results can guide curriculum by shedding light on the connections between IL, entrepreneurial intentions, and entrepreneurial skills among business students. These findings may be used by policymakers in the education field to create and enhance educational programs that encourage students to develop their entrepreneurial and IL skills. To better prepare students for entrepreneurial endeavors, educators can integrate IL training and exercises into the curriculum. The study's findings may point to particular areas where students' entrepreneurial or IL skills are lacking. To successfully address these issues, specific interventions and support systems may be created using the information provided. In addition, these results have the potential to highlight specific areas where students' entrepreneurial or IL abilities need improvement. Using the information supplied, specialized treatments and support systems may be developed to successfully address these difficulties. The study's findings may be used to highlight the significance of IL in a variety of professional pathways by highlighting its usefulness for problem-solving, decision-making, and flexibility in a changing labor market. The study's findings can provide direction for organizations and governments working to promote entrepreneurship through the efficiency of IL programs as a way to foster and encourage young entrepreneurs in the area.

These findings may encourage an innovative culture and ethical business practices in District Sargodha by placing more of a focus on entrepreneurship and IL. The research can further our understanding of IL and entrepreneurship in the particular setting of Pakistan's District Sargodha. To further examine and expand our understanding of this relationship, researchers and academics may build on these results. As a whole, the study's findings may be used as a basis for future investigation, the creation of public policy, and practical activities targeted at fostering entrepreneurship and IL among business students in District Sargodha, Pakistan.

7. Limitations

This research has several limitations that should be acknowledged when attempting to generalize its findings. Firstly, the study relied on self-reported measures to gauge information literacy (IL), entrepreneurial intention, and entrepreneurial skills. Consequently, there is a possibility that participants may have overestimated their levels of IL, entrepreneurial intention, and entrepreneurial skills. Secondly, the research sites were purposely selected, and the survey respondents were recruited through a convenience sampling method, both belonging to non-probability sampling, which may have resulted in the inclusion of a non-representative sample for this study. Lastly, data collection was limited to only two institutions within the district of Sargodha, Punjab, Pakistan. Therefore, this research does not purport to represent the perspectives of all business students in Pakistan.

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Article

An Analysis of Perceived Organizational Support and Organizational Climate on the Supportive Leadership–Employee Wellbeing Linkage in the Lebanese Academic Sector

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Abstract: Leaders are determinants of employee behavioral and work outcomes across industries. Notably, in the higher education sector where staff are required to perform various tasks while delivering knowledge to the younger generation, thus shaping the future of society. The current research employs social exchange and social identity theories to investigate the direct effect of supportive leadership on the wellbeing of employees. The indirect effects of organizational climate as a mediator, and perceived organizational support as a moderator are examined to better understand the underlying predictors of wellbeing in academia. Surveys were collected using a purposive and convenience sampling method and analyzed using partial least squares–structural equation modeling (PLS-SEM) with Smart-PLS software, Version 3. The results show that the wellbeing of academic staff is not only influenced by the role and behavior of leaders but also the dynamics that surround it, namely, organizational climate aligned with the leadership efforts, and perceived organizational support among the staff that provides security, sense of belonging, and identity, leading to improved wellbeing. Organizational support when perceived by staff members can significantly boost the effectiveness of leadership efforts towards enhancing employees’ wellbeing.

Keywords: supportive leadership; organizational climate; perceived organizational support; employee wellbeing; academia

1. Introduction

The environment of organizations in today’s dynamics requires a leadership approach that yields positive psychological outcomes among staff members. For the case of the academic sector, it is important to note the high expectations of the staff to perform well regarding their educational and administrative roles and responsibilities. Leaders can shape the atmosphere of the workplace in a positive light, where the experiences of members are enhanced. Supportive leadership as a modern approach in the literature is focused on the current study due to its relevance in the academic sector. This style of leadership can be described as a leader who exhibits attentiveness to their staff and their needs (Farid et al., 2021). These leaders also provide emotional and instrumental support as well as engaging in appreciative behaviors, which can have a major impact on the wellbeing of employees in the organizational setting (Kelloway et al., 2013; Rajashekar & Jain, 2024) and their innovativeness and engagement at work (Jia et al., 2022; Stein et al.,

2021). Supportive leadership in higher education settings can act as a pivotal determinant of psychological, social, and emotional wellbeing (Hannah et al., 2020), which can manifest as higher productivity, engagement, and effectiveness in using human capital sustainably (Asghar et al., 2022; Sarmah et al., 2022). As the current study examines the relationship between supportive leadership and employees' wellbeing in the academic sector, it is important to note that most studies focus on healthcare and corporate environments. This implies that there is a gap in the academic setting especially in the Middle East as it is underexplored, underdeveloped, and needs empirical evidence such as the case of Lebanon (Chami-Malaeb et al., 2024; Malaeb et al., 2023). Thus, a major driver for the conduct of this study is the scarcity of available studies examining such contexts in the extant literature of leadership and employee wellbeing.

The wellbeing of employees under certain leadership approaches is a complex subject as there are numerous conditions that influence this (e.g., organizational climate). In this respect, the organizational climate can be described as practices, procedures and expectations of behavior within the organization that is perceived by its members (Khan et al., 2021; Viitala et al., 2015). This climate can impact on the relationship between leaders and the employees and the dynamics that can define the employee outcomes (e.g., wellbeing). Additionally, perceived organizational support (POS) explains the belief and perception of employees regarding the degree to which the organization values their work and contributions while caring for their wellbeing, which can be an enhancer for the leader-wellbeing relationship (Ilyas et al., 2023; Pattali et al., 2024). The current research argues that the combined premises of social exchange theory (SET) and social identity theory (SIT) can elaborate on the perception of employees towards supportive treatment from the leader and the organization itself. Through this lens, the employees are more likely to engage in reciprocative behavior with a positive attitude developed towards the firm, leading to a higher level of wellbeing (social, psychological, and emotional) (R. Ahmad et al., 2023). SIT also posits that fostering a strong sense of identity with the firm, which is linked to leadership and perception of support can have a significant contribution to the psychological and wellbeing of the staff members (Greco et al., 2022), particularly in the case of academia due to the previously noted high expectations from the academic staff (e.g., educational and administrative roles) (S. F. Ahmad et al., 2022).

In accordance with what was noted, the current study aims to examine the role of supportive leaders in academia for promotion of employee wellbeing in the Lebanese context. In doing so, the current research (a) assesses the direct impact of supportive leadership on employees' wellbeing (psychological, emotional, and social); (b) analyzes the mediating role of organizational climate on the said relationship; and (c) examines the moderating (enhancer) role of perceived organizational support in this context. These aims highlight the contextual setting of the research, which follows a set theoretical premise that specifically assess the wellbeing of employees in the academic sector of Lebanon (i.e., universities). Thus, the contributions of this study are made to the literature of organizational behavior and leadership with a particular context of the education sector in the Middle East. This addresses the noted gaps and calls in the literature for obtaining empirical evidence in this region due to the underexplored and scarcity of studies (Al Hadrawi et al., 2023; Arar, 2020; Bray & Hajar, 2023; Jia et al., 2022).

In addition to the previously noted gaps, when the region has economic, social, and other challenges, the academic sector becomes more important as it requires adaptivity and emotionally intelligent leaders who can facilitate motivation, support, and professional and personal wellbeing (S. F. Ahmad et al., 2022; Jia et al., 2022). Through establishing an adequate organizational climate, and leveraging perceptions of organizational support, supportive leadership can enhance the workplace in terms of effectiveness, productivity,

and wellbeing (social, emotional, and psychological) (Khan et al., 2021; Pattali et al., 2024). Moreover, the current research deploys a modern analytical technique (i.e., PLS-SEM), which utilizes empirical evidence with robust accuracy and reliability to validate the hypotheses and theoretical framework of the research. For the specific context of Lebanese universities, the political, financial, and structural limitations should be considered as a major factor that affects the psychosocial dynamics of employees and their wellbeing. Thus, the current research contributes to a practical domain of the education sector which reveals how embedding supportive leadership can guide the workplace towards a climate that provides employees with necessary tools to have a high level of wellbeing (e.g., emotional support, instrumental support, and appreciative behavior) (Sarmah et al., 2022). This study argues that through establishing such a workplace climate, supportive leaders can yield emotional, psychological, and social wellbeing for their academic staff, which in turn can manifest in a higher performance for the department/faculty. This gains a higher importance in the Lebanese context as per the previously noted limitations and challenges.

The psychological wellbeing aspect can be gained through supportive leadership behaviors under the premises of social exchange theory (SET) (R. Ahmad et al., 2023), which suggests the perception of support from the leader can trigger positive responses from the employees. Similarly, both emotional and social wellbeing dimensions can be improved through a supportive leader who provides a collective identity and belonging (Al Hadrawi et al., 2023; Greco et al., 2022). This combination enables the current study to contextualize both leader–employee relationship and the institutional setting that can drive the organization towards a more sustained performance despite the resource restrictions (i.e., climate and support). As majority of studies emphasize on Western or East Asian countries, the gap in the dynamics of leadership and wellbeing outcomes, particularly in the education sector of the Middle East is a crucial driver for the conduct of this study (Arar et al., 2022; Abdelwahed & Doghan, 2023; Bray & Hajar, 2023).

2. Hypotheses and Theories

2.1. Theoretical Setting

In the current study, the role of supportive leaders can be grounded in the premises of social exchange theory (SET) (Blau, 1964), where the social behaviors of staff members are determined by the exchanges where individuals tend to be risk averse while trying to increase their benefits. In the academic organization setting, this manifests as a reciprocation among the employees and their leaders (Montano et al., 2017). Hence, in return for the supportive behavior of the leaders (emotional, instrumental, and appreciative behavior), employees can exhibit commitment, engagement, and better psychological and emotional wellbeing (Farid et al., 2021; Jia et al., 2022; Xuecheng et al., 2022). SET in the current context explains the affective outcomes of supportive leadership for academic staff, which in turn not only enhances their wellbeing but can manifest as a higher performance (Farid et al., 2021; Zeb et al., 2023) and innovative work behaviors (Jia et al., 2022). SET has been used in higher education and other public sectors, which confirms the relational quality and perception of fairness from leaders are essential for achieving positive employee outcomes (e.g., wellbeing) (Montano et al., 2017; Zeb et al., 2023).

In addition to what was noted, the current research also benefits from the premises of social identity theory (SIT) (Tajfel & Turner, 1979) as the sense of identification, self-concept, and a certain belonging to social groups further enhance the behavioral outcomes and wellbeing among employees. In this sense, academic staff can thrive under an organizational climate where a shared identity persists, leading to an alignment between the values of the organization and the employees (Ho & Chan, 2022). In this research, SIT provides a framework wherein the academic staff perceive being valued along with support from

their organizations and their leaders, which enhances their work experiences by heightening their sense of identity and purpose (Krug et al., 2021). Subsequently, this leads to a better wellbeing including the social, psychological, and emotional dimensions (Canto & Vallejo-Martín, 2021) that are operationalized in this study. SIT is a widely used framework in the educational literature, which supports the identity dynamics and the interplay of emotional and psychological wellbeing (Gong & Wang, 2023).

The combined premises of SET and SIT enable the current study to develop the hypotheses that are also illustrated in the proposed model (see Figure 1).

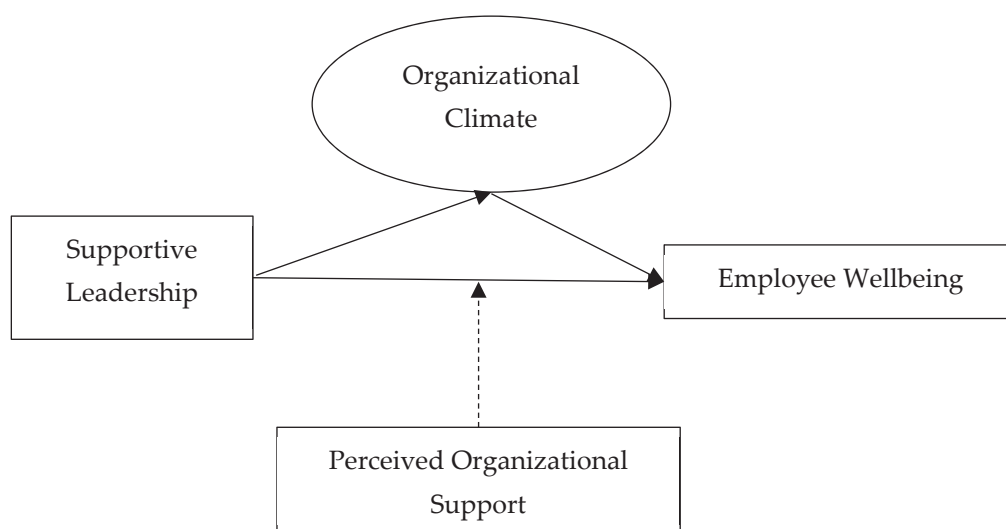


Figure 1. Research Model.

2.2. Supportive Leadership and Employees' Wellbeing

A supportive leader incorporates three core aspects in their behavior towards the employees and their overall outlook for the workplace namely, instrumental support, emotional reassurance, and appreciative behavior (Farid et al., 2021). These elements are significant determinants of employees' psychological and emotional wellbeing, which can also link to their social wellbeing as the dimensions for overall wellbeing (Niinihuhta & Häggman-Laitila, 2022; Rachmad, 2022). When supportive leaders are in action, their concerns and support are practical, genuine, and thorough, which further encourages collaboration, sense of value, and emotional security (Curtin et al., 2022). This becomes more important for the case of academic staff as emotional stability can increase their productivity and job satisfaction (Liang & Chu, 2021), contributing to their wellbeing. It is recommended that leaders focus on developing employee-centered approaches as they can improve resilience through reducing stress and negative emotional responses in high pressure sectors (i.e., education) (Kelloway et al., 2012). This argument benefits from the premises of SET (Blau, 1964) where the socio-emotional bonds that are established between a leader and their staff can drive reciprocity, higher engagement with the job, trust, commitment, and overall performance and wellbeing (Farid et al., 2021; Liang & Chu, 2021), rendering such behaviors as crucial for obtaining positive outcomes.

In line with what was noted, the supportive leader and their behaviors (i.e., emotional, instrumental, appreciative) goes beyond the transactional interactions in the workplace by fostering trust, which in turn leads to a collective sense of identity. This falls under the premises of SIT (Tajfel & Turner, 1979; Kelloway et al., 2012). SIT explains how these leadership traits can establish belongingness among the academic staff, which promotes their sense of identity with the organization (i.e., university). A meta-analysis conducted by Montano et al. (2023) revealed that while mental health hazards can be negated by

supportive leadership traits, the performance of employees can be improved as their psychological, social, and emotional wellbeing is provided with safety and support at work. As academic staff are required to use cognitive and emotional resources, such leaders can be a major determinant of avoiding burnout and disconnectedness (Kurtessis et al., 2017; Maslach & Leiter, 2022). Both SET and SIT provide a wide perspective through which supportive leadership dimensions act as functions of the domains of wellbeing (i.e., social, emotional, and psychological) (Montano et al., 2017). Accordingly, the following hypothesis has been developed:

Hypothesis 1: *Supportive leadership and its dimensions have a direct and positive impact on academic staffs' wellbeing and its dimensions.*

2.3. Mediating Role of Organizational Climate

Organizational climate can be described as a shared sense and perception of the workplace that can include leadership, communications and interactions, expected behaviors, and work–life balance (Y. Zhang et al., 2021). This climate, when applied to the organizational setting (e.g., through supportive leadership), can translate into improved wellbeing of employees as it pertains to their emotional demands that are particularly high in the education sector (Greco et al., 2022; Stein et al., 2021). Supportive leaders have the capabilities to provide employees with emotional, instrumental, and appreciative support, which innately changes the atmosphere of the workplace into a climate of trust, cooperation, and respect (Jia et al., 2022; Parker et al., 2003). Organizational climate can be a significant mediator for linking leadership efforts to the wellbeing outcomes of employees as it encompasses positive changes in the workplace and deliverance of supportive intentions in a tangible manner that affects employees' wellbeing (Y. Zhang et al., 2021). Under the premises of SET (Blau, 1964), the current research argues that when academic staff perceive supportive leadership traits, they are more likely to reflect this support in their overall welfare and performance (Roberts, 2010; Schneider et al., 2013). As a reciprocative behavior with a supportive workplace, employees are prone to exhibit emotional and psychological engagement, which creates a deeper feeling of wellbeing (Jiang & Probst, 2021; Zohar & Hofmann, 2012). Notably, when the leadership approach is also supportive, the wellbeing outcomes of social, emotional, and psychological can be expected due to the complementary influence of leadership on the climate of the organization.

Following what was noted, the SIT framework (Tajfel & Turner, 1979) provides a premise with which the organizational climate can promote a sense of identification with the company, which can highlight and empower the emotional and social attributes to employees through supportive leadership behavior (García-Cabrera & García-Soto, 2021; Jia et al., 2022). Positive and ethical leadership approaches have been found to have a positive influence on organizational climate, rendering supportive leadership a similar contextual setting wherein through emotional, instrumental, and appreciative behaviors of leaders, employees gain a higher level of wellbeing, affecting their personal and professional domains (García-Cabrera & García-Soto, 2021). Notably, organizational climate has been found to have a mediating effect when it comes to leadership outcomes in various settings (Jiang & Probst, 2021), which further implies its application in a higher educational context. In the academic sector, there are high expectations from academic staff which can include ambiguity, emotional and psychological labor, and performance-related stress and anxiety (Horoub & Zargar, 2022; Montano et al., 2023).

The theoretical premises of SET and SIT provide sufficient support for the interrelationship among leadership behavior, climate of the workplace shaped under leadership style, and multifaceted wellbeing outcomes among employees due to the psychological and emotional safety, belonging, being valued, professional and personal support, and

a shared sense of achievement and goal, which can magnify wellbeing. Organizational climate (especially as a mediator) is shaped through the instrumental, emotional, and appreciative support of the leader, which can then manifest as employee performance and wellbeing outcomes. This has been reported in extant literature (e.g., Hayat & Afshari, 2021; Khan et al., 2021; Schneider et al., 2013; Y. Zhang et al., 2021), which provides support for the current research to operationalize organizational climate with leader support, role clarification, and recognition/appreciation and reward dimensions.

The climate is a shared perception of policies, regulations, procedures, and expectations in the workplace, which are heavily reliance on the behavior and style of leadership. When the supportive leadership traits are present in the higher education setting, the fairness, value of job, and trust-building elements can be established for the staff which in turn can improve their wellbeing (Hayat & Afshari, 2021; Parker et al., 2003). This perception of climate can be improved through clarification of roles, provision of necessary knowledge, tools and equipment, supportive supervision, and job autonomy, which can significantly improve affective commitment along with mental and social dimensions of wellbeing (Y. Zhang et al., 2021; Zohar & Hofmann, 2012). Furthermore, it has been reported that the values of leadership can be better aligned with employees' values through a workplace climate that exhibits support on a routine basis (Canli & Özdemir, 2022; Khan et al., 2021). Under the perspective of SET, the organizational climate shaped by a supportive leader can yield effectiveness in terms of utilizing resources, encouraging trust and commitment, and fostering positive reciprocal attitudes that can vividly improve wellbeing. In a similar vein, SIT suggests that such climates can create cohesiveness and affirmation among employees, which creates identification that leads to a better state of psychological and social wellbeing. As universities have a hierarchical structure, and demands are high from the academic staff, and in accordance with the noted arguments, the following hypothesis is developed:

Hypothesis 2: *Organizational Climate can mediate the relationship between supportive leadership and employee wellbeing in the Lebanese academic sector.*

2.4. Moderating Role of Perceived Organizational Support

Perceived organizational support (hereafter POS) can be described as a perception of appreciation and being valued for an individual in the workplace setting (Eisenberger et al., 2016). This care and support provided to the staff members can be a major source of improvement for wellbeing as it pertains to the interactions and relationships that are formed in the workplace (e.g., leadership traits) (Ilyas et al., 2023; Pattali et al., 2024). POS is crucial for industries where demands and stress are high, and roles can deplete the psychological and emotional resources of individuals (i.e., education sector) (Greco et al., 2022). Under the premises of SET (Blau, 1964), employees can develop a positive perception when organization values their work and contributions while exhibiting genuine care for their wellbeing (social, emotional, and psychological). This is more than mere behavioral traits of leaders and requires a systemic and strategic implementation of support mechanisms for employees. Such practices can yield loyalty, trust, innovation, and resilience among academic staff (Asghar et al., 2022; Jia et al., 2022). In the current context, supportive leaders possess traits that are a good fit for obtaining wellbeing among employees (emotional, instrumental, and appreciative behaviors). This aligns with the premises of POS as it addresses a deep and comprehensive organizational approach towards the workplace and employees' outcomes. This suggests that POS can be an enhancer (moderator) for the positive supportive leadership traits and their effort for achieving a higher level of wellbeing for staff in the higher education setting of Lebanon (Caesens et al., 2021; Eisenberger et al., 2016). This is linked to the reduction in stress, uncertainty, and ambiguity, which in

turn shows care from the organization particularly for academic roles, which have a high workload (Shoss et al., 2021).

Referring to the premises of SIT (Tajfel & Turner, 1979), POS can act as a resource as well as a tangible tool for the company to provide institution-wide support practices that can foster a sense of belonging, involvement, commitment, and trust among employees (Jia et al., 2022). Having developed a sense of identification with the values of the organization steers employees towards a higher level of POS, which boosts their self-concept and alignment with the objectives of the organization. For the specific context of Lebanese higher education institutions, job security, emotional and psychological safety, and uncertainty in role descriptions are considered important elements that a supportive leader and organization can address to improve POS. When the workplace is demanding and has stressors, social and psychological wellbeing are negatively influenced, which can be diminished through a high level of POS (Shoss et al., 2021). For academic staff in faculties of Lebanese universities, there are numerous limitations and stressors, which can negate their wellbeing. Thus, the implementation of supportive organizational policies can act as an enhancer of wellbeing among employees while contributing to the efforts of leadership to improve the workplace.

The above mentioned arguments fall under the theoretical framework of the research where SET and SIT can explain the importance of POS as a moderator for the relationship between supportive leadership traits and wellbeing outcomes. In this respect, when leaders (as organizational stewards) exhibit care for their employees and provide them with training, equipment, and feedback while showing appreciation for the value of their work, it is more likely that POS is increased among employees (Rhoades & Eisenberger, 2002). This can have vivid implications for enhancing the wellbeing of academic staff especially for the case of Lebanese universities with regard to the various challenges and limitations (e.g., political, economic, social, and technological) (Ben Hassen, 2024; Chami-Malaeb et al., 2024). Supportive leaders have the necessary traits (i.e., emotional support, instrumental support, and appreciative behavior) to offer unbridled support, assurance, and safety to employees, which can be perceived more through the existence of a higher level of POS.

Supervisors are also important elements that need support from their organization, which highlights another aspect of the vitality of POS in an organizational setting. A supportive procedure in the organization (POS) can also boost the leaders' efforts to increase employees' sense of identity, commitment, and overall performance, which require a high level of wellbeing and is aligned with the premises of SIT. Through group cohesion, a psychological, emotional, and social attachment shapes enhance the perception of fairness, value, and identity (Hayat & Afshari, 2021; Ilyas et al., 2023; Shanock & Eisenberger, 2006). Similarly, due to the strategic nature of practices that yield POS in an organization, there is an innate outcome that consists of resilience, improved performance, and satisfaction for employees, which are antecedents of wellbeing (Eisenberger et al., 2016). This research argues that for the case of Lebanese universities and their academic staff, it becomes essential to have procedures for establishing and/or improving POS, which entails legitimacy and support for both leaders and employees. In turn, this can be manifested as legitimate strategies that are guided by a supportive leader and can present the commitment of the organization to enhancing emotional, social, and psychological wellbeing of academic staff. In the light of what is mentioned in this section, the following hypothesis is presented:

Hypothesis 3: *Perceived Organizational Support has a moderating (enhancer) effect on the relationship between supportive leadership and academic staff's wellbeing.*

3. Research Design

3.1. Methodology and Approach

This study utilizes a quantitative and deductive approach (Casula et al., 2021), where a convenience sampling method is used to obtain the necessary data to test the current hypotheses. Firstly, the purposive sampling method enabled the researchers to ensure that participants are academic staff with both teaching and administration responsibilities. This was followed by a convenience sampling method with which participants were selected based on their availability and willingness to participate. The respondents were chosen from four different universities in Beirut, Lebanon. Relevant permissions were granted from the managers (i.e., departmental deans) of the said universities prior to the data collection process. A pilot test with 15 samples was conducted, where no items were removed or added to the survey and readability and understandability were confirmed. The pilot test data were excluded from the final analysis. Sample size was calculated using G*power software version 3.1 (statistical power 90%; effect size 0.15; $\alpha = 0.05$), which was shown to be 106. This was combined with the recommendations for PLS-SEM (Hair et al., 2017), which led to a range of 106 to 150. Accordingly, a total of 180 questionnaires were distributed among academic staff of four universities in Beirut, from which a total of 141 surveys remained for the final analysis (78.33% response rate). A written consent form was provided to participants where they were informed of the purposes of the study, confidentiality of the data, and anonymity along with availability to withdraw.

3.2. Measurements

The questionnaire was designed based on the most relevant, valid, and available scales in the existing literature. In this sense, supportive leadership (operationalized as emotional, instrumental, and appreciative support) was measured with three questions for each dimension based on the works of Rudolph et al. (2022) and Sarmah et al. (2022). Samples for each item are as follows: (1) My supervisor listens attentively to my concerns; (2) My supervisor assists me in solving work-related problems; and (3) My supervisor recognizes my achievements. Furthermore, employee wellbeing and its dimensions (i.e., emotional, psychological, and social) are measured using three questions for each dimension derived from the reliable and commonly used measures (i.e., Canli & Özdemir, 2022; Farid et al., 2021; Montano et al., 2017). Sample questions are as follows: (a) I feel emotionally drained at the end of the workday; (b) I find my work meaningful and fulfilling; and (c) I feel a sense of belonging within my work team, for emotional, psychological, and social wellbeing, respectively. This is followed by nine questions (three for each dimension) to measure organizational climate through the operationalization of leader support, role clarity, and recognition and reward as dimensions. These questions were derived from the works of Canli and Özdemir (2022), Imran and Anis-ul-Haque (2011), and Y. Zhang et al. (2022). Sample questions are as follows: (1) Leaders are accessible when employees need guidance; (2) My job duties are well-defined; and (3) Employees are rewarded fairly for their contributions. Lastly, perceived organizational support was measured using three questions derived from the work of Eisenberger et al. (1986) with a sample question “My organization shows concern for me”.

3.3. Sample Characteristics

Following the literature review, the current structural model consists of three control variables, namely, age, gender, and work experience. These factors are controlled in the analytical stages as they can have an impact on the outcomes of the analysis due to their influence on psychological aspects (Cheng et al., 2022; Ng & Feldman, 2009; Pelled et al., 1999). There are no major differences between male and female students with 68 and

73 responses; the majority of participants had an experience between 1 and 4 years (48.23%) followed by less than one year (32.62%) and more than 4 years (19.15%); the age range of respondents varied between 25 and 30 (32.62%) followed by 31 and 36 (31.92%), 37 and 45 (24.12%), and more than 45 years of age with 11.34% of the total 141 samples. The profile of the respondents is shown in Table 1 below:

Table 1. Demographic Characteristics.

Age	Frequency	Percentage
25–30	46	32.62%
31–36	45	31.92%
37–45	34	24.12%
+45	16	11.34%
Gender		
Male	68	48.22%
Female	73	51.78%
Work Experience		
<1 year	46	32.62%
1–4 years	68	48.23%
+4 years	27	19.15%

N = 141.

3.4. Research Model

Following the contextual framework the aims of the study, a causal model is developed, which is illustrated in Figure 1. In this model, supportive leadership is the independent variable; employee wellbeing is the dependent variable; organizational climate is the mediator; and perceived organizational support is the moderator.

4. Findings

The model presented in Figure 1 is examined through Smart-PLS software Version 3 and the analytical technique of partial least squares–structural equation modeling (PLS-SEM) where latent variables exist, normal distribution is not a concern, and the accuracy of analysis is relied upon a relatively small sample size (Hair et al., 2017). Accordingly, Table 2 presents the first stage of analysis in which measurement model is assessed and is found to be statistically satisfactory. This is due to the acceptable values for outer loadings, Rho A, alpha (α), and composite reliability (CR) (between 0.7 and 0.9) (Jöreskog, 1971; Diamantopoulos et al., 2012; Dijkstra & Henseler, 2015; Hair et al., 2019). Similarly, average variance extracted (AVE) is found satisfactory (more than 0.5) stating the convergent validity of the dataset (Hair et al., 2017).

Furthermore, Table 2 accounts for the reflective variables, variance inflation factor (VIF), which is below 3, stating no concerns for multicollinearity (Henseler et al., 2009). In addition, Table 3 presents the Heterotrait–Monotrait ratios (HTMT), which are below 0.85, stating a satisfactory convergent validity along with an adequate reliability for the current parameters (Henseler et al., 2015).

Table 2. Measurement Model.

Construct	Dimensions	Indicator	Outer Loadings	α	Rho A	CR	AVE	VIF	Weights	t-Stat.	CV
Supportive Leadership $\alpha = 0.811$ CV = 0.708	Emotional	EM1	0.722	0.804	0.811	0.802	0.662	1.845	0.369	2.309 **	0.713
		EM2	0.797						0.411	2.220 **	
		EM3	0.774						0.366	2.188 **	
	Instrumental	IN1	0.840	0.775	0.785	0.744	0.721	1.741	0.376	2.112 *	0.726
		IN2	0.824						0.381	2.301 **	
		IN3	0.811						0.374	2.345 *	
	Appreciative	AP1	0.821	0.742	0.745	0.719	0.715	2.348	0.523	3.308 **	0.730
		AP2	0.749						0.440	2.304 *	
		AP3	0.813						0.376	2.121 *	
Employee Wellbeing $\alpha = 0.802$ CV = 0.711	Emotional	EW1	0.841	0.834	0.867	0.808	0.748	1.864	0.413	2.431 *	0.729
		EW2	0.815						0.446	2.235 *	
		EW3	0.809						0.432	2.380 *	
	Psychological	PS1	0.867	0.782	0.761	0.771	0.737	1.877	0.502	2.610 *	0.711
		PS2	0.725						0.389	2.546 *	
		PS3	0.770						0.432	2.726 *	
	Social	SW1	0.791	0.785	0.809	0.738	0.725	1.944	0.384	2.688 *	0.733
		SW2	0.788						0.361	2.764 *	
		SW3	0.779						0.377	2.620 *	
Perceived Organizational Support	-	POS1	0.844	0.855	0.881	0.832	0.545			-	
		POS2	0.826								
		POS3	0.817								
Organizational Climate $\alpha = 0.796$ CV = 0.726	Leader Support	LS1	0.713	0.773	0.814	0.765	0.624	1.870	0.409	2.451 *	0.721
		LS2	0.745						0.419	2.266 *	
		LS3	0.721						0.413	2.73 *	
	Role Clarity	RC1	0.719	0.801	0.833	0.841	0.708	1.921	0.349	2.135 *	0.749
		RC2	0.733						0.401	2.440 *	
		RC3	0.729						0.367	2.391 **	
	Reward and Recognition	RR1	0.779	0.748	0.739	0.781	0.724	1.936	0.413	2.345 *	0.739
		RR2	0.815						0.415	2.301 *	
		RR3	0.774						0.411	2.411 *	

* 0.05, ** 0.01.

As the measurement model assessment presented in Tables 2 and 3 show adequacy for further analysis, Table 4 shows that both normal fit index (NFI) and standardized root mean square residual (SRMR) imply a good model fit with values of 0.921 and 0.023, respectively. Similarly, r-square (predictive power) and q-square (predictive relevance) are both found to be acceptable, which further implies the accuracy of the current model (Hair et al., 2019). Thus, the structural model assessment that tests the hypotheses of the study is shown in Table 4, where all hypotheses are supported. The first hypothesis (direct effect of supportive leadership on employee wellbeing) is supported as $\beta = 0.318$, $t = 4.918$. This is followed by support for the second hypothesis with statistical significance of the mediating role of organizational climate on the supportive leadership–employee wellbeing ($\beta = 0.188$, $t = 2.833$). Lastly, the third hypothesis is supported by the current findings ($\beta = 0.183$, $t = 2.716$) reflecting the moderating (enhancer) effect of POS on the supportive leadership–employee wellbeing relationship.

Table 3. Heterotrait–Monotrait ratio (HTMT).

	EM	IN	AP	EW	PS	SW	POS	LS	RC
EM	-								
IN	0.711	-							
AP	0.444	0.522	-						
EW	0.722	0.604	0.723	-					
PS	0.631	0.637	0.621	0.645	-				
SW	0.607	0.609	0.644	0.634	0.705	-			
POS	0.637	0.497	0.661	0.594	0.679	0.680	-		
LS	0.519	0.537	0.608	0.581	0.544	0.671	0.677	-	
RC	0.607	0.610	0.577	0.613	0.598	0.479	0.616	0.620	-
RR	0.577	0.549	0.611	0.603	0.634	0.629	0.626	0.673	0.709

Emotional leadership: EM; Instrumental leadership: IN; Appreciative behavior: AP; Emotional wellbeing: EW; Psychological wellbeing: PS; Social wellbeing: SW; Perceived organizational support: POS; Leadership support: LS; Role clarity: RC; Reward and recognition: RR.

Table 4. Structural Model Assessment.

Effects	Relations	β	t-Statistics	f^2	Decision
Direct					
H1	SL $\rightarrow$ EW	0.318	4.918 ***	0.134	Supported
Mediation					
H2	SL $\rightarrow$ OC $\rightarrow$ EW	0.188	2.833 **	0.038	Supported
Moderation					
H3	SL*POS $\rightarrow$ EW	0.183	2.716 **	0.037	Supported
Control Variables	Age $\rightarrow$ EW	0.120	2.021 *		
	Gender $\rightarrow$ EW	0.123	2.203 *		
	Experience $\rightarrow$ EW	0.119	2.177 *		
		$R^2_{IP} = 0.44/Q^2_{IP} = 0.24$ $R^2_{GI} = 0.51/Q^2_{GI} = 0.27$ SRMR: 0.023; NFI: 0.921			

* 0.05, ** 0.01, *** 0.001.

These results suggest that university managers can incorporate supportive practices in their organization to ensure positive performance and wellbeing outcomes, which can be boosted through implementation of supportive leaders to further improve the organizational climate and yield significant improvements in psychological, social, and emotional domains of academic staff's wellbeing. The moderation effect can also be seen in Figure 2, where the interaction plot is illustrated. The supportive leadership interaction was measured with standard deviation of 1.313 and mean of 1.678, while POS was measured with standard deviation of 1.117 and mean of 0.979. Figure 2 shows that through high levels of POS, universities can reach higher levels of wellbeing with the supportive leader in action. This also suggests that with lower levels of SL (perhaps in the early stages of establishment), higher POS can still yield significant wellbeing outcomes for academic staff of Lebanese universities.

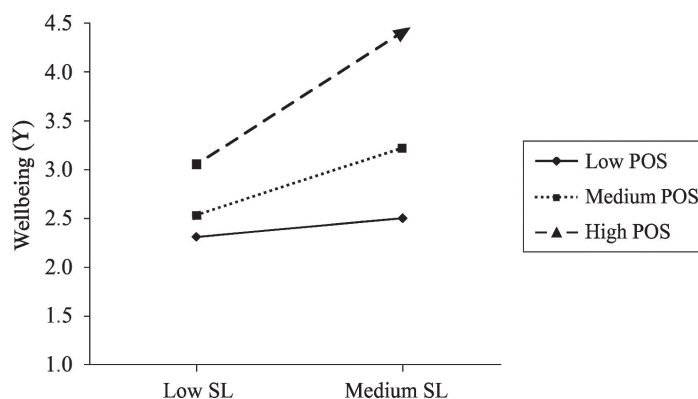


Figure 2. Interaction Plot.

Discussion

The support for the first hypothesis of the research shows that supportive leaders in the academic setting of Lebanon (i.e., universities) can make a difference by affecting the wellbeing of academic staff across emotional, psychological, and social domains, which is also aligned with the premises of SET (Blau, 1964). This is also in line with the existing literature, which shows that emotional support, instrumental aid, and appreciative behaviors of leaders can have a significant influence on employees' wellbeing and performance outcomes (e.g., Curtin et al., 2022; Farid et al., 2021; Niinihuhta & Häggman-Laitila, 2022). As shown in this research, academic setting is a sector in which supportive leadership traits can overcome the limitations of institutional or structural support dynamics. Furthermore, the current results are in consensus with the premises of SIT (Montano et al., 2017; Tajfel & Turner, 1979), where it elaborates on the mechanisms of employees and their emotions regarding their treatment and support by the organization. Thus, when supportive leaders deploy their traits in the university context, academic staff are more likely to internalize identity with the university which improves their psychological, social, and emotional wellbeing through positive communications, connectedness, and social values and belongingness (Kelloway et al., 2012; Liang & Chu, 2021). This also highlights the contributions of the current research to literature as it extends the geographical borders to Middle East (i.e., Lebanon) and education sector which faces both local and regional instabilities in society, political, economic, and institutional domains (Chami-Malaeb et al., 2024; Malaeb et al., 2023). The combination of SET and SIT frameworks also validates the empirical findings of the current study as it provides a comprehensive setting for better understanding the dimensions of wellbeing and the organizational mechanisms that influence its outcome (Montano et al., 2017).

The mediation effect of organizational climate on the supportive leadership—employee wellbeing relationship was found significant (partial) which implies that the workplace environment that fosters respect, safety, trust, and support can deliver the behaviors of leaders to employees in a tangible manner (Montano et al., 2017). As the socio-emotional, and psychological needs of employees are met by leaders' behaviors, reciprocity is triggered which drives the staff towards having a healthier relationship with their organization, leading to an increase in their overall wellbeing. This mediating role is also in line with SIT as it explains the alignment of employees with a group identity through meaning, emotional resources, and shared values. The current findings while highlighting the contextual, theoretical, and sectoral contributions are also in line with the existing body of knowledge (e.g., García-Cabrera & García-Soto, 2021; Y. Zhang et al., 2021). Leadership can obtain more effective outcomes through a climate that emphasizes their approach and style. This can help the leaders to improve morale and performance of their employees. Due to political stress and underfunding in the education sector in Lebanon, these findings

can be a driver for universities to improve their workplace. Organizational climate as a mediator in university context in a Middle Eastern country shows the applicability of supportive leadership traits (emotional, instrumental and appreciative) in a manner that enables them to shift and change the climate of the faculty /department.

The partial mediation effect is further complemented by the statistical significance of the indirect and moderating influence of perceived organizational support (POS) on the supportive leadership—academic staff’s wellbeing linkage. POS can act as an amplifier that can manifest as commitment among employees while being a tool for the leaders to create meaning, trust, value, reciprocation, and identity among their employees (Rhoades & Eisenberger, 2002; Eisenberger et al., 2016). In turn, leaders are made able to drive performance and improved wellbeing for their staff. Employees can sense a deeper care and belonging from their organization which is elaborated through the leadership’s behavior which can boost emotional, social, and psychological wellbeing. These findings also show consensus with the existing literature that address the leader-follower interactions and outcomes (e.g., Abolnasser et al., 2023; Makwetta et al., 2021; Sarwar et al., 2020; Shanock & Eisenberger, 2006). Integration of POS as a moderator enables the current research to interpret the underlying factors that contribute to the wellbeing of academic staff in Lebanese universities (Makwetta et al., 2021; Rajashekar & Jain, 2024), which can be beneficial for scholars interested in leadership outcomes in organizational settings and practitioners such as human resource management departments in universities where supportive practices can be established on a company-wide scale.

5. Conclusions

The results obtained in this study suggest that supportive leadership can be a great pathway for universities in Lebanon (and to extension, the Middle East region) to achieve significant levels of wellbeing for academic staff. Emotional bonds, instrumental aids (e.g., technical support, training and development programs), and appreciative behaviors of leaders can yield emotional, social, and psychological wellbeing for academic staff of Lebanese universities. Providing the leaders with supportive organizational practices and procedures can further boost the said wellbeing domains, while also providing the employees with an environment that has established support mechanisms, leading to enhanced perceived organizational support (Caesens et al., 2021; Eisenberger et al., 2016; Rajashekar & Jain, 2024). This also aligns with the notions of organizational climate that pertains to leader support, role clarification, and rewards and recognitions (Abolnasser et al., 2023; Canli & Özdemir, 2022; Rasool et al., 2021; Y. Zhang et al., 2022). Supportive leaders can benefit from the organizational support mechanisms to better translate their visions into tangible practices that positively affect the climate of the workplace through clear instructions and expectations, and recognition of performance while rewarding engagement, involvement, innovation, and other forms of performance outcomes (Rudolph et al., 2022; Sarmah et al., 2022). These results imply both theoretical and practical perspectives which are highlighted in the following sections.

5.1. Theoretical Implications

The theoretical contributions of the current study are to the understanding and application of social exchange theory (SET) (Blau, 1964). Results demonstrate the dynamics of supportive leadership traits and the initiation of reciprocative behavior among academic staff of Lebanese universities. This creates an emotional bond between the leaders and staff, which if perceived genuine, positive outcomes in emotional state, psychological health, and social wellbeing can be observed. This is in line with other studies, in which similar contextual settings have been addressed (e.g., Kelloway et al., 2012; Liang & Chu,

2021; Montano et al., 2017). Furthermore, organizational climate as defined in this study (i.e., leader support, role clarity, and rewards/recognition) better explains and translates the approach of leaders as an identity in the workplace, which aligns with the wellbeing outcomes (García-Cabrera & García-Soto, 2021; Y. Zhang et al., 2021). Similarly, the enhancing effects of POS falls within the premises of SET as higher or lower perceptions of institutional support can shape a broader sense of care, which in turn improves engagement and involvement among employees. This ultimately strengthens the interactions and relationships among the leaders (i.e., faculty deans) and their staff (i.e., university level academic staff) (Eisenberger et al., 2016; Rhoades & Eisenberger, 2002). Application of SET in academic sector of Middle Eastern universities is, thus, supported by empirical evidence, which can be used as a comparative result with non-Western and other sectors in the literature.

In addition to the abovementioned notes, social identity theory (SIT) (Tajfel & Turner, 1979) can be observed in the current findings as the linkage between leaders' behaviors and wellbeing of academic staff is highly influenced by the ability of leaders and the organization to create a sense of identity for their staff (particularly academic staff). Supportive leadership traits can establish an environment in which emotional and relational bonds are created with staff to improve their sense of identity (e.g., pride, academic prowess, and belonging) (Jiang & Probst, 2021; Y. Zhang et al., 2021). This can be a source that leaders use to better deliver change to organizational climate while benefiting from institutional mechanisms that provide complementary and/or necessary support systems (Kelloway et al., 2012; Liang & Chu, 2021). When academic staff develop their identification with their leaders and the university, it empowers their psychological and social wellbeing, especially when leaders engage in supportive behaviors (Gong & Wang, 2023). These implications also show consensus for POS as a function that provides validation for groups (i.e., academic staff) as a social element in the workplace which improves the sense of identity, leading to improved wellbeing outcomes (Eisenberger et al., 2016; Hayat & Afshari, 2021; Ilyas et al., 2023). The current results thus highlight the importance and applicability of SIT in the education sector of Middle East (i.e., Lebanon) which sheds light on the vitality of identity, values, and social context of a supportive workplace for academic staff.

5.2. Practical Implications

In addition to what was mentioned, the current research provides several practical pathways for practitioners (e.g., managers in universities of Lebanon, and Middle East) as there should be an emphasis on provision of strategic value by implementing support mechanisms. This provides the necessary foundation for POS which then can be utilized by adequate leadership (i.e., supportive) with institutional support that also enables them to shape the climate of the faculties in their vision with strategic alignment with human resources and other supportive initiatives. Universities can benefit from this structure as it can enable them to train needed leaders in-house with a deep understanding of the specific contexts of their organization while fostering wellbeing for academic staff. Through provision of feedback, mental support, clarification in job descriptions and expectations, recognition and rewarding innovation, and other positive behaviors in the workplace can significantly improve the psychological and emotional wellbeing of academic staff as it balances the pressures and limitations they face in their work. A data-driven human resource management system can be specifically used by leaders (e.g., faculty deans) which can improve resilience, agility, and performance of academic staff among Lebanese universities. Furthermore, universities can have dedicated Key Performance Indicators (KPI) for wellbeing measures in their leadership assessment and pathways for managerial

promotions. This can also aid the talent and employee retention, engagement and long-term benefits for the organization as a unit.

5.3. Limitations and Recommendations

Regardless of the previously noted contributions, there are a number of hindering elements that should be addressed. The current study used a quantitative approach and PLS-SEM as analytical technique, which deals with limited sample size, hindering the generalizability of findings. Future studies can avoid this issue by expanding the sample size. The cross-sectional data collection procedure also limits the variations that can occur, which longitudinal studies can overcome. Middle Eastern countries and particularly Lebanon can benefit from more studies that can improve the understanding of organizational behavior, leadership, and wellbeing outcomes to contribute to reducing the scarcity of data in this regard. Qualitative methods can also be used in future studies to obtain a more in-depth understanding of leadership–wellbeing relationship. The current research uses SIT and SET, which provide sufficient theoretical framework for its conduct. Future studies can employ other theories such as job demand–resource theory, conservation of resources theory, and leader–member exchange theory. Cultural, social, and political factors can also be determinants or influential in this context, which can be addressed by future studies to improve upon the contextual limitations of this research.

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Article

Toxic Leadership and Job Satisfaction in the Middle Eastern Education Sector: The Influence of Organizational Culture and Trust

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Abstract: Toxic leadership has profound implications for employees' psychological wellbeing, particularly in academia, as a supportive workplace is crucial for intellectual prosperity and growth. In various parts of the Middle East, toxic leadership has been a major element in suppressing academic freedom, low levels of creativity, and innovation backed with favoritism, nepotism, and lack of support. This study examines the detrimental effects of toxic leaders on academic staff's job satisfaction among academic staff in Middle Eastern universities. Grounded in the social learning theory, leader–member exchange theory, and conservation of resources theory, this research examines the mediating effect of organizational culture and trust in leaders. A quantitative approach using partial least squares—structural equation modeling with Smart-PLS software Version 3—was deployed on survey data from 236 faculty members and academic administrators across 11 universities in the region. The results show that toxic leadership significantly reduces job satisfaction, which is better explained by key mediating elements of organizational culture and trust in leaders. The findings highlight the need for fostering a culture of trust, leadership development, and transparent strategies to enhance the academic workplace for the staff and improve the dynamic and performance of the educational environment in the region. This study provides practical recommendations for mitigating toxic leadership in the education sector of the Middle East through empirically validating its detrimental effects on the psychological wellbeing of academic staff, which is a major element that barriers significant academic achievements.

Keywords: leadership; organizational culture; trust in leader; job satisfaction; psychological wellbeing; middle east

1. Introduction

The importance of leadership for organizational success and achievements is established in the literature in different sectors (e.g., F. Alanezi, 2021; Smith & Fredricks-Lowman, 2020; Zargar et al., 2019; Saleem et al., 2021; Jones, 2006). In the context of the current research, we focus on toxic leadership due to its negative and unique characteristics that can diminish a number of elements in the organization. This is due to the hindering effects these leaders have on their employees by creating a toxic environment that reduces trust (Farmanesh & Zargar, 2021), job satisfaction (Matos et al., 2018; Uysal, 2019; Fahie, 2019), engagement (Rasool et al., 2019; Rasool et al., 2020), motivation (Milosevic et al., 2020), and

wellbeing (Emirie & Mengistu Gebremeskel, 2024; Yaghi & Yaghi, 2021). As can be observed in the extant literature, the issue of toxic leadership is noted in a variety of settings, which states its complex nature.

Depleting the shared agenda of toxic leadership is a significant obstacle to overcome in some Middle Eastern countries. However, there are a few cross-cutting elements that cut across borders and overlap in most of these nations. A strategy such as the consolidation of power is a common unethical leadership practice that is often used by toxic leaders in the Middle East (Padilla et al., 2007). Leaders prioritize the maintenance of power as a top agenda and maintain their hold on it by using a variety of tactics and strategies to use the power to their advantage to maintain their grip on the institutions they run (Alayoubi et al., 2020).

Throughout the nations of the Middle East, certain toxic leaders intentionally sow racial and ethnic discord in order to further their own political agendas and advance their own personal interests (Byman, 2002). Toxic leaders in the Middle East often violate human rights, including civil, political, and social rights (Shaw, 2012). It is possible for leaders to engage in practices such as the restriction of people's rights to freedom of speech, assembly, and religion, as well as arbitrary arrests, torture, and extrajudicial murders. Both corrupt business practices and poor management of the economy stymie the growth of the economy, which in turn impacts and exacerbates socioeconomic disparities (Bajada & Shashnov, 2019). Toxic leaders have made it the order of the day to accumulate shared resources intentionally and deliberately for the purpose of enriching themselves while denying the common masses of advantages to the country (Mackey et al., 2021). As a result, these leaders have neglected the welfare of their population and impeded equitable development.

As a result of the significant impact that toxic leadership concerns have on democratic governance and stability, as well as human rights and the dynamics of the area, it is very essential that these issues be addressed and that efforts be made to foster good and ethical leadership in the region (Thoroughgood et al., 2018).

The current research aims to contribute to the understanding of toxic leadership and its effects in an academic setting in the Middle East, as it has been noted in the existing literature that toxic leadership persists in the region, particularly in the academic sector. Due to the importance of organizational culture, this factor is also examined based on the diversity of participants in this research. This enables the researchers to interpret data regarding any differences among numerous nationalities within the scope of toxic leaders and their impact on organizational culture and trust. Furthermore, this research aims to contribute to the literature by providing empirical evidence from the Middle East, which is relatively less examined in this context.

In the scope of this research, toxic leadership is regarded specifically in the education sector, stating that the role of these leaders is essential in forming the educational atmosphere through organizational culture. Toxic leadership can be described as an approach in which the motives, behaviors, and style of the leader are negative, disruptive, and destructive (Koo et al., 2022; Smith & Fredricks-Lowman, 2020). These can cause several negative psychological outcomes originating from the workplace and its environment, such as stress, anxiety, turnover, decreased performance, and job satisfaction, among others (Goldman, 2006; Mahlangu, 2014). As a crucial element of leadership effectiveness, trust is notably violated by toxic leaders (Al Zaabi et al., 2018). Toxic leaders can yield undesirable outcomes for organizations, such as potential for negative behaviors including low commitment and engagement, burnout, and turnover, which can have dire impacts on the overall wellbeing of employees. Specifically, in the current research, the influence of toxic leaders on the atmosphere of trust is examined as a mediating effect. A lack of or low levels of trust as major psychological elements have vivid impacts on employees' work-related behaviors.

The current research follows a string of research that focuses on leadership and trust after the COVID-19 pandemic (e.g., Farmanesh & Zargar, 2021; Saleem et al., 2021; Khan, 2021).

In this respect, this study uses a set of theories and criteria to address the effect of toxic leaders on job satisfaction alongside the influence of trust and organizational culture. The endeavor aims to provide a better understanding of the psychological wellbeing of employees (i.e., academic) who have been selected based on the aforementioned criteria. These are further explained in the design section of the research. These are in accord with the noted gaps in the literature pertaining to toxic leadership, empirical evidence, the Middle Eastern context, and sample specification of academic employees (i.e., university teachers and administrators). Toxic leaders affect the future of societies due to the educational setting and student relationships that are under their influence. This study aims to highlight the hindering effect of these leaders in an academic setting that can have long-term effects on societies.

2. Hypotheses and Theories

2.1. Toxic Leadership and Job Satisfaction

The social exchange theory best explains the relationship between toxic leadership and job satisfaction, as previously used by Brouwers and Paltu (2020). In the context of the social exchange theory, people take part in a social exchange process between an organization and its leadership structure. This suggests that workers typically evaluate their experiences at work based on what they offer in exchange for the cost–benefit analysis that is performed (Brouwers & Paltu, 2020). Toxic leaders produce unfavorable interactions in the workplace, and this, in turn, inflicts emotional suffering and produces a hostile work environment. As a result of unethical behaviors of the leaders, it creates the psychological connection between leaders and employees is interrupted, which, in turn, results in job dissatisfaction (Orunbon et al., 2022).

Toxic leadership breaches the reciprocal expectations of respect, fairness, and support, which ultimately leads to a breakdown of trust and a decrease in work satisfaction for those affected. It is possible for workers to have emotional exhaustion, lack of motivation, and disengagement, which have a negative impact on their overall job satisfaction (A. Alanezi, 2024).

The social exchange theory fits in the scope of current research as it pertains to the concept of toxic leaders and their overall impact on the wellbeing of individuals in the workplace. The literature shows that toxic leadership has explicit negative effects on the job satisfaction (physical and psychological components) of their subordinates through stress and anxiety, inducing destructive and abusive behavior that results in demotivation, low engagement, burnout, and turnover (Behery et al., 2018). Within the context of the education industry, the role of these leaders is more crucial due to their second-level impact on society and younger generations.

In the premise of social exchange theory, this research argues that job satisfaction of employees in the academic setting is directly influenced by toxic leaders in a manner that hinders their overall wellbeing. This research is focused on the direct outcome of hindered wellbeing (i.e., job satisfaction) among the staff, which can in turn impact their interactions with students and thus have an influence on the educational setting and overall experience of university students. In this scope, it is also important to describe the notion of job satisfaction in this research. As an influential element, job satisfaction entails both physical and psychological aspects of a job, such as workplace environment, incentives, income, and group and supervisor relationships (Clark et al., 1996; Schmidt, 2008; Zargar et al., 2019). Toxic leaders tend to have controlled behavior, which reduces autonomy and innovation and causes both mental and physical problems for their followers due to stress,

toxic organizational culture, and performance (Smith & Fredricks-Lowman, 2020; Jones, 2006; Firing et al., 2022).

Akca (2017) observed that toxic leadership has some negative consequences on job satisfaction and the work environment; however, it should not be confused with transactional leaders or difficult people. On the one hand, a decisive, demanding, and sometimes verbally abusive leader may not necessarily be “toxic” to people (Tavanti, 2011). On the other hand, even charming and cheerful leaders may be toxic. It is not necessarily the attitudes and style of communication that make a leader toxic, it is the systemic discouraging effects that often indicate toxic dynamics (Erickson et al., 2015). Toxic leaders might be highly competent and effective in their jobs, but they contribute to an unhealthy climate among their peers and subordinates with consequences far beyond the morale of a few victims. Toxic leaders are generally highly competent and effective in the short-sighted sense, but in the long run, they carry high human and financial costs. They like to succeed by tearing others down.

Toxic leadership generally has a negative impact on employees’ performance in the workplace. However, it is important not to only focus on the negative effects of toxic leadership. In rare instances, there are some positive effects of toxic leadership in the workplace (Winn & Dykes, 2019). According to Winn and Dykes (2019), the limited positive effects of toxic leadership are short-term or superficial in nature. In some contexts, toxic leadership may increase motivation and resilience. Toxic leadership can make some employees become more determined and motivated to showcase their worth or overcome adversity in response to a toxic leader, especially in a context where the ultimate choice is working and dealing with the toxic leaders (Zhang et al., 2015).

Toxic leaders can intentionally create a challenging environment that can eventually lead employees to develop a coping mechanism and foster a sense of resilience and determination in individuals who are driven to succeed despite the obstacles they face (Hitchcock, 2015). The consistent attitude and behavior of toxic leaders can be a driving force that may lead individuals to reflect on their own values, strengths, and weaknesses. This self-reflection can promote personal growth, self-awareness, and the development of coping strategies to navigate difficult situations (Laguda, 2021).

Toxic leadership can also strengthen unity and support among employees (Erdal & Budak, 2021). Especially when the employees are faced with the ultimate choice of dealing with a toxic leader, employees may band together and provide mutual support. They may tend to share the experience of dealing with a toxic leader, which can foster a sense of camaraderie and solidarity among colleagues, leading to stronger bonds and increased collaboration (Lipman-Blumen, 2006). On the other hand, dealing with toxic leaders may result in employees developing conflict resolution skills amongst themselves. In such situations, employees may develop and refine their conflict resolution skills to manage interpersonal conflicts and find constructive solutions.

In accordance with what was mentioned, the following hypothesis has emerged:

Hypothesis 1. *There is a significantly negative effect on job satisfaction among academic staff through toxic leadership.*

2.2. Trust in Leader

Trust is a complex psychological factor that entails several aspects, such as intention, expectation, and accepting weaknesses, which are explained through cognitive, affective, and behavioral forms of trust (Farmanesh & Zargar, 2021). In this respect, the level of trustworthiness of an individual is cognitive; the emotional component linked to the formation of trust is affective, and reliance and actual trust are regarded as behavioral trust. In the current context, these are reflected in the attitude and approach of the leader in an

organizational setting whose culture is also affected through the destructive and abusive traits of toxic leaders (Behery et al., 2018). Due to the negative behaviors of toxic leaders and their traits (e.g., authoritarian, narcissistic), the workplace environment deteriorates into an unethical and devaluing setting that impacts the three dimensions of trust with regard to other people (cognitive), emotional states in the workplace (affective), and lack of behavioral trust towards the leader and peers (Gillespie & Mann, 2004; Behery et al., 2018; Rousseau et al., 1998). This implies that the role of toxic leaders in the workplace cannot be neglected due to their influence on the overall work setting, in which academic staff are to perform their tasks. It is argued in this study that toxic leaders are diminishing to the wellbeing of their staff during and after a crisis (Emirie & Mengistu Gebremeskel, 2024; Witzel, 2022).

The effect of toxic leaders on the workplace is explicit as they disregard ethical means of conduct. This is highly influential in terms of establishing an environment of trust for the staff, particularly towards their leaders (Firing et al., 2022; Mergen & Ozbilgin, 2021). The current research specifically examines the role of trust (more accurately, its absence) in the relationship between toxic leaders and job satisfaction of academic staff. It is also important to note that the element of trust is a highly important factor in the current context, as it is deeply rooted in the organizational culture that is led by a toxic leader.

Within the confines of leader–member exchange (LMX) theory, the linkage and interaction between leader and each follower is described as an ongoing process, which has outcomes linked to interpersonal trust. The implication of LMX and its coverage of trust as a theoretical framework within psychology is observed in the extant literature (e.g., Liden et al., 1997; Brower et al., 2000; Scandura & Pellegrini, 2008; Zhou et al., 2021; Bellou & Dimou, 2022; Meng et al., 2017). Therefore, it is appropriate that LMX is regarded in the current context as toxic leaders negatively impact trust as their interactions are unethical, biased, and authoritarian. Considering the vivid influence of toxic leaders on trust and its formation in an organizational setting, where social interactions occur routinely, the following hypothesis is shaped:

Hypothesis 2. *Trust in the leader has a mediating effect on the toxic leader–job satisfaction relationship.*

2.3. Organizational Culture

Organizational culture is a broad term that covers operations, people, and processes of work. In the educational setting, organizational culture is highly important for strategies and managing change or crises (Tierney, 1988; Smith & Fredricks-Lowman, 2020). Accordingly, the environment, mission, socialization, information, strategy, and leadership are noted as dimensions of organizational culture. Notably, environment pertains to and includes both the organization and the society that it is located in; for the mission, it is important to be clear in its message as a guideline; interactions among staff (groups or teams) are regarded as socialization (e.g., collaborative); information pertains to its flow and its communication across the organization; strategies of the firm refer to ones that can be inclusive, exclusive, or other forms regarding their employee relationships; and leadership is the manner with which the company steers itself and highlights its goals and visions that is shown in its cultural work setting. These are dimensions that shape the organizational culture specifically in a university setting. When toxic leaders are present, the work environment becomes hostile and, in the long term, can have significantly undesirable results for the organization (Cleary et al., 2013; Khasawneh et al., 2024).

It has been observed in the literature of toxic leadership that it is more possible to rise in collectivist, ambiguity-avoidant, and power-distant societies (Powers et al., 2016; Twale & De Luca, 2008). Organizations where toxic leaders can have more impact are those that give them more control over the workplace (e.g., institutions, highly competitive markets,

and politicized economies) (Khasawneh et al., 2024; Frazier, 2011; Thomas, 2010; Smith & Fredricks-Lowman, 2020). This research argues that in the Middle East, the cultural settings are often traditional and, thus, are suitable for strong experiences for leadership positions, which, if toxic, can have dire effects on the organization specifically in the education setting (i.e., universities) (Ahmed et al., 2024; Farley & Sprigg, 2014). Under toxic leadership organizational cultures, the employees are mistreated, and their values are disregarded as the emphasis is on organizational and/or personal achievements and not the wellbeing of individuals.

Similarly, conservation of resource (COR) theory suggests that individuals experience stress when they do not have adequate physical or psychological resources to cope with the stressor (Hobfoll, 2011; Koo et al., 2022; Lipman-Blumen, 2006). In the context of current research, toxic leaders are described as self-promoting, abusive, unpredictable, narcissistic, and authoritarian/controlling (Schmidt, 2008). Combining both COR and social learning theories, subordinates of toxic leaders must endure “role models” who increase stress through their conduct. Furthermore, employees of toxic leaders are deprived of adequate autonomy, resources, and other physical and psychological components that are needed for completing tasks. In the education sector, it is important to note that employees had to change to an online setting upon the occurrence of the global pandemic, and, thus, various challenges were posed to the mental and physical health of academic staff. It is reported in the literature that loneliness, work–life balance, autonomy, stress and anxiety, and other negative factors have been observed among academic staff (e.g., Smith & Fredricks-Lowman, 2020; Farmanesh & Zargar, 2021; EL Telyani et al., 2022; Telyani et al., 2021; Zakhem et al., 2022).

Due to the stressful workplace environment that is established by toxic leaders, employees are prone to emotional instability, which can have dire impacts on their satisfaction, trust, creative and innovative behavior, and overall performance (Whicker, 1996). Within the premises of COR theory, toxic leaders tend to assign unjust tasks that staff are often incapable of performing. This in turn leads to a workplace environment that is unethical, unhealthy, and with negative organizational culture values (Zhao et al., 2013; Winn & Dykes, 2019; Rasool et al., 2020). Ethics are diminished in the presence of toxic leaders. This can negatively influence workflow and interactions (social) in the workplace, which, during uncertain times of a global pandemic, can be more problematic for the employees involved (i.e., academic staff) (Farmanesh & Zargar, 2021; Burton & Hoobler, 2011). Both work engagement and commitment are negatively influenced under the leadership of a toxic character, as the cultivation of negative aspects in the organizational culture leads to decreased trust, low morale, and diminished psychological resources. In these scenarios, both the toxic leader and the toxic organizational culture coincide with one another and create a climate that can impact the wellbeing of individuals (Ahmed et al., 2024; Saleem et al., 2021).

Social learning theory is also related to both social cognitive and self-determination theories (Bandura, 1989). In this regard, in a social setting (i.e., workplace), individuals interact with and learn from each other alongside reciprocating behaviors and actions. Emotional and cognitive components are involved in the interactions, and thus, group and/or supervisor relationships are influential on all those involved (Oden et al., 2019; Telyani et al., 2021). In the current context, the noted theories and findings in the literature show that organizational culture and toxic leadership are linked, which further increases their effects on individuals in a workplace that requires high levels of resources (demanding job of teachers) (Baskan, 2020; Green, 2014; Aubrey, 2012; Singh et al., 2018). In light of what was mentioned above and the aims of the current research, the following hypothesis is designed:

Hypothesis 3. *Organizational culture has a mediating effect on the job satisfaction–toxic leadership linkage among academic staff.*

3. Research Design

3.1. Methodology and Criteria

The current study takes a quantitative approach, in which the purposive sampling method was used to ensure that the participants have experienced and/or are experiencing toxic leadership (direct or indirect among managers). We established contact with deans and/or managers in each university and conducted discussions with them regarding the aspects and context of toxic leadership. Upon ensuring that the characteristics of toxic leadership are witnessed and persist in these institutions, we selected them for data collection. Researchers used an extensive network of contacts to discuss the specifics of the research and the characteristics of toxic leaders with each participant. Using G*power version 3.1, and recommendations of Hair et al. (2017) ($\alpha = 0.05$, effect size: 0.15, statistical power: 90%), the sample size was calculated between 182 and 230. Participation was completely voluntary, and all participants were given written consent forms and were provided with confidentiality and anonymity. Withdrawal of responses was also made possible at any given stage upon participants' request. The purposive sampling enabled the researchers to establish the presence of toxic leaders in 11 universities across the Middle East. These were from Turkey, Jordan, Iran, Iraq, Lebanon, the Emirates, and Saudi Arabia due to similarity in the context of toxic leadership (A. Alanezi, 2024; Göçen, 2021; Jabbouri, 2023; Koo et al., 2022). The positions of these leaders ranged from mid-level manager to dean, rectorate, and high managerial levels. Upon this establishment, the snowballing method was used to increase the number of respondents based on their availability and willingness to participate. The inclusion criteria and combined sampling techniques further increased the response rate to 100%, as 236 distributed surveys were returned (via email or file transfer) (excluding a pilot test with 28 university teachers from 2 universities that were eliminated from the final analysis).

According to the review of the literature, toxic leadership harms workers and the company. Toxic leadership decreases employees' wellbeing, subordinates' organizational citizenship behavior, job satisfaction, organizational commitment, organizational performance, loyalty, trust, followers' active engagement, employees' mental and physical health, and productivity, according to Tepper and Duffy (2002). Toxic leadership is rising and can hurt the organization and its employees. Poisonous leadership has emerged to define its qualities and behaviors (Milosevic et al., 2020). There is little research on toxic or destructive leadership, but there is an increase in studies on harmful behaviors, which researchers categorize as abusive, tyrannical, destructive, bullying, unethical, or toxic (Li et al., 2023).

Most educational administration studies have disregarded the negative aspect of leadership. This ignorance exposed educational dark leadership research. Toxic school leaders are like other leaders (A. Alanezi, 2024). Toxic leadership cuts across cultural and contextual factors that may influence Middle Eastern leadership practices since they share similar cultural norms (Hattab et al., 2022). Most educational administration studies have disregarded the negative aspect of leadership. This ignorance exposed educational dark leadership research. Toxic school leaders are like other leaders (Babatunde & Nurudeen, 2020). Questionnaire scales from the previous literature identified toxic leaders in 11 Middle Eastern universities. Toxic leadership cuts across cultural and contextual factors that may influence Middle Eastern leadership practices since they share similar cultural norms (Dorfman, 1996).

Deductive research questions or hypotheses are based on a theoretical framework or body of knowledge (Casula et al., 2021). These hypotheses were based on theories, scientific

findings, or logical inferences (Powell, 2001). Next, the study approach and data-gathering methods were structured to prove or disprove the hypothesis (McCutcheon & Meredith, 1993). A relevant theory or body of knowledge to underpin the investigation is deployed (Darko et al., 2020). The theory aids hypotheses and research questions. Based on theory, the researcher creates precise hypotheses. Research design and data collection methods gather empirical data to test hypotheses. The researcher selects appropriate tools, identifies variables, and accumulates relevant data (Dawadi et al., 2021). Data are analyzed using statistical or analytical methods to determine variable relationships. Analysis determines how much data supports or contradicts assumptions (Schmiedel et al., 2020). Analysis informs the researcher's assumptions and evidence. Results are then given inside the theory. The deductive method lets you refine or change hypotheses based on data (Harley & Cornelissen, 2022). Quantitative research uses the deductive method to test hypotheses using statistical analysis (Adler, 2022). Qualitative research uses detailed research questions to guide data collection and analysis.

3.2. Respondents' Profile

The age of participants had an average of 34.8 years ($SD = 5.7$), and the majority were male, at 67%. The overall average for work experience was found to be 6.1 years ($SD = 6.3$). It was also found that the majority of the participants (68%) were married. To comply with ethical means of conduct and ensure data anonymity and confidentiality while decreasing method bias, no personal or sensitive (e.g., income, and religion) data were obtained from participants.

3.3. Measurements

The toxic leadership scale was derived based on the toxic leadership scale (Kilic & Günsel, 2019), considering each characteristic (self-promoting, abusive, unpredictable, narcissistic, and authoritarian/controlling). The questions pertaining to job satisfaction were taken from a job satisfaction survey (Spector, 1985). An organizational culture survey (Tierney, 1988) was used to measure this factor concerning its dimensions (environment, mission, socialization, information, strategy, and leadership). Notably, as toxic leadership is examined in current research and based on the inclusion criteria, the presence of such leaders is established among participants, and the leadership dimension of organizational culture is measured through this factor. Lastly, to measure trust in leaders from educational and academic staff in various universities, the organizational trust inventory (Nyhan & Marlowe, 1997) was used.

Data Collection—The respondents' consent was requested so as not to put them in a precarious position when it came to participation (this was approved by the Near East University with the code EKK22-23/015/010). The questionnaire was only distributed to individuals who actively agreed to participate. Lecturers and administrative staff who consented to participate were included in the selection criteria. The constructs used were toxic leaders (15 items), which have five dimensions (self-promotion (3), abusive (3), unpredictable (3), narcissistic (3), and controlling (3)); organizational culture (15 items), which have five dimensions (environment (3), mission (3), socialization (3), information (3), and strategy (3)); trust (4), and job satisfaction (4)). Due to the reliability and validity of the prior work, these constructs were adopted. The reliability of the accepted scales demonstrates that the concepts of toxic leadership, job satisfaction, and trust are all reliable.

3.4. Research Model

Based on the hypotheses, aims, and objectives of the research, a model is designed that is tested through a set of criteria for sampling and analytical approaches. While the

model is illustrated in Figure 1 below, procedures and techniques deployed for the study are explained in the following sections:

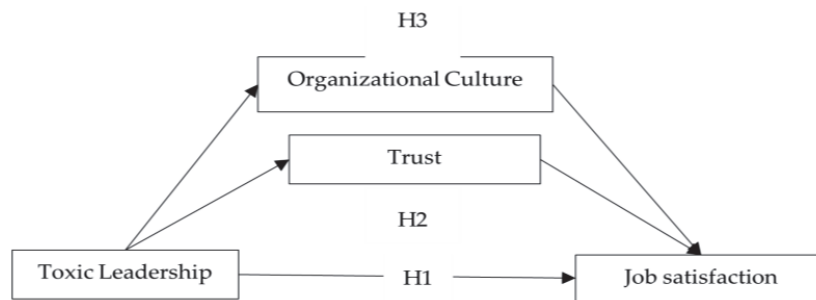


Figure 1. Research model.

4. Analysis and Discussion

The model illustrated in Figure 1 is analyzed through PLS-SEM due to the criteria that contain latent variables, disregard normal distribution, and entail a relatively small sample size (Hair et al., 2017). Based on the measurement model test shown in Table 1, loading values remain between 0.7 and 0.9, which is similar to Rho A, alpha, and composite reliability values that are statistically satisfactory (Jöreskog, 1971; Diamantopoulos et al., 2012; Dijkstra & Henseler, 2015; Hair et al., 2019; Zakhem et al., 2022; Sousan et al., 2022). The heterotrait-monotrait (HTMT) results are also within the acceptable range (<0.85) and average variance extracted (AVE) shows values that surpass 0.5, stating the satisfactory level of convergent validity of the data at hand with regard to its items (Henseler et al., 2017; Hair et al., 2017). These findings state that the current model can be regarded as ‘fit’ based on the parameters that are included. Notably, the current model is designed to address the aforementioned aims and objectives of this study and to yield interpretative findings that can be beneficial for both scholars and practitioners. The results of HTMT are shown in Table 2 of the study.

Table 1. Measurement model.

Factors	Dimensions	Indicators	Outer Loadings	Alpha	Rho A	CR	AVE
Toxic Leadership	Self-promoting	SP1	0.724	0.809	0.831	0.824	0.635
		SP2	0.816				
		SP3	0.902				
	Abusive	AB1	0.826	0.749	0.811	0.753	0.704
		AB2	0.808				
		AB3	0.813				
	Unpredictable	UNP1	0.851	0.707	0.736	0.737	0.708
		UNP2	0.728				
		UNP3	0.811				

Table 1. Cont.

Factors	Dimensions	Indicators	Outer Loadings	Alpha	Rho A	CR	AVE
Toxic Leadership	Narcissistic	NRC1	0.789	0.788	0.771	0.813	0.767
		NRC2	0.746				
		NRC3	0.795				
	Controlling	CNT1	0.803	0.821	0.765	0.794	0.745
		CNT2	0.819				
		CNT3	0.744				
Job Satisfaction	—	JS1	0.843	0.873	0.842	0.866	0.732
		JS2	0.827				
		JS3	0.874				
		JS4	0.746				
Trust in the Leader	—	TR1	0.886	0.890	0.938	0.856	0.575
		TR2	0.808				
		TR3	0.803				
		TR4	0.723				
Organizational Culture	Environment	ENV1	0.850	0.806	0.911	0.845	0.582
		ENV2	0.841				
		ENV3	0.823				
	Mission	MS1	0.823	0.802	0.830	0.841	0.721
		MS2	0.845				
		MS3	0.757				
	Socialization	SC1	0.887	0.771	0.757	0.720	0.678
		SC2	0.890				
		SC3	0.703				
	Information	INF1	0.765	0.783	0.766	0.813	0.731
		INF2	0.744				
		INF3	0.823				
	Strategy	STR1	0.794	0.794	0.740	0.822	0.714
		STR2	0.772				
		STR3	0.809				

Based on the results that can be observed in Tables 1–3, it can be interpreted that the current model is approved in terms of its validation. Accordingly, it is important to report various indices that fall into the normal fit index (NFI = 0.923) and have standardized root mean square residuals.

(SRMR = 0.021), VIF < 3 (no multicollinearity), and R-square and Q-square state both predictive power and relevance, respectively (Henseler et al., 2009; Hair et al., 2019). The results that are presented in Tables 3 and 4 pertain to what was noted while providing statistical support for the hypotheses of this research.

Table 2. Heterotrait-monotrait ratio (HTMT).

	SP	AB	UNP	NRC	JS	TR	ENV	MS	SC	INF
SP										
AB	0.708									
UNP	0.488	0.534								
NRC	0.706	0.635	0.734							
JS	0.631	0.713	0.665	0.722						
TR	0.701	0.485	0.673	0.722	0.801					
ENV	0.711	0.702	0.701	0.724	0.724	0.746				
MS	0.466	0.564	0.560	0.622	0.701	0.7012	0.722			
SC	0.512	0.544	0.598	0.578	0.598	0.588	0.611	0.628		
INF	0.537	0.613	0.633	0.649	0.612	0.671	0.622	0.637	0.677	
STR	0.628	0.698	0.648	0.670	0.703	0.720	0.733	0.711	0.702	0.719

Table 3. Assessment of reflective-formative constructs.

Construct	Items	Convergent Validity	Weights	VIF	t-Statistics
TL	Self-promoting	0.722	0.373	1.860	4.105
	Abusive		0.371	1.761	4.041
	Unpredictable		0.518	2.232	5.052
	Narcissistic		0.388	1.798	4.127
	Controlling		0.314	1.716	4.198
OC	Environment	0.717	0.413	1.924	5.337
	Mission		0.404	2.012	5.459
	Socialization		0.387	1.903	5.349
	Information		0.408	1.874	5.364
	Strategy		0.411	2.019	5.297

Table 4. Hypothesis testing.

Effects	Relations	β	t-Statistics	$\mathcal{F}^2$	Decision
Direct					
H1	TX $\rightarrow$ JS	−0.312	−5.229 ***	0.102	Supported
Mediation					
H2	TX $\rightarrow$ TR $\rightarrow$ JS	−0.343	−2.348 *	0.108	Supported
H3	TX $\rightarrow$ OC $\rightarrow$ JS	−0.361	−3.689 *	0.112	Supported
Control Variables					
	Gender $\rightarrow$ JS	0.132	2.514 *		
	Age $\rightarrow$ JS	0.119	2.132 *		

Notes: * $p < 0.05$, *** $p < 0.001$; $R^2_{TR} = 0.37/Q^2_{TR} = 0.17$; $R^2_{OC} = 0.51/Q^2_{OC} = 0.29$; $R^2_{JS} = 0.60/Q^2_{JS} = 0.34$; SRMR: 0.021; NFI: 0.923.

Hypotheses of the research are tested through PLS-SEM, and the results are shown in Table 4. In this regard, the results show that the first hypothesis of the research is supported, which states the direct and negative effect of toxic leadership on job satisfaction ($\beta = -0.312$). Similarly, both mediators that have been included in the model have proven to have significant effects on the relationship between toxic leadership and job satisfaction.

In this sense, trust has been found to have a negative effect on job satisfaction in the presence of toxic leaders, which was expected, as such leaders tend to diminish the environment that is necessary for trust-building ($\beta = -0.343$). Organizational culture has also been found to have a negative effect on the relationship, which further shows that through toxic leaders, organizational culture becomes a negative determinant of employees' job satisfaction and overall psychological wellbeing ($\beta = -0.361$). Notably, organizational culture has been found to be more influential compared to trust. This can be linked to other aspects that are inherent in organizational culture and can be linked to the physical workplace and/or interactions that occur during work (i.e., supervisors, peers, and/or students). These findings support both the second and third hypotheses of the current research in terms of the negative influence of toxic leaders in reducing trust, poisoning organizational culture, and inevitably decreasing job satisfaction of their employees in the education sector. The results that are presented in Table 4 suggest that the role of toxic leaders in negatively affecting the educational workplace cannot be neglected due to its importance in both organizational settings (i.e., organizational culture and trust) and employee outcomes (i.e., job satisfaction).

As can be observed from the findings, toxic leadership significantly reduces job satisfaction among the academic staff of Middle Eastern universities, supporting the argument that destructive leaders foster a hostile workplace, where educational growth is deteriorated. According to the literature, this leads to emotional exhaustion, diminished trust, and lower commitment towards the organization (Harvey et al., 2021), which, in turn, can diminish the performance of the staff. In this context, this can have dire consequences for students and their educational achievements. The mediating mechanisms of both organizational culture and trust in leadership are also highlighted in the results. A workplace culture that is toxic reinforces the negative influence of leaders and exacerbates the impact on the satisfaction level of employees. Additionally, it decreases the trust in leaders, which weakens the relationship between leaders and members, leading to broken engagement and motivation among the staff (Schilling et al., 2022). These findings are in line with the theoretical framework of social learning theory (Bandura, 1977), where toxic leaders' behavior worsens the workplace culture and environment as staff respond to the observed actions of their leaders. Similarly, leader-member exchange theory (Graen & Uhl-Bien, 1995) suggests that the poor quality of the relationships between leaders and members reduces the wellbeing in the workplace as it reduces trust. Conservation of resources theory (Hobfoll, 1989) also reinforces the notion that staff members exposed to toxic leader behaviors experience depletion of their mental resources, which directly contributes to their burnout and dissatisfaction (Klotz et al., 2021). Thus, the underpinning understanding is that toxic leadership creates an atmosphere where negative consequences in the academic sector can arise in the long term, leading to a lack of achievements for academic staff and, in turn, the academic performance of students.

The social learning theory suggests that adopting behaviors occurs and is reinforced through observation (Bandura, 1977), which is in line with the current findings. Toxic leaders are negative role models, and they pose a detrimental influence on their employees (e.g., defensive workplace behavior), which lowers their overall job satisfaction. Due to the creation of a hostile workplace by toxic leaders, stress, anxiety, dysfunctionality, and uncertainty are infused into the staff, which lowers their engagement and motivation and ultimately, their job satisfaction (Schilling et al., 2022).

Similarly, LMX theory states that when exchanges between leaders and members maintain equality, they can directly contribute to positive workplace outcomes and vice versa (Harvey et al., 2021). Diminishing trust is vital in this context and agrees with the existing literature, suggesting that destructive, unethical, and poor leadership behaviors

reduce the bonds between the leader and their staff, leading to erosion of commitment and dissatisfaction with the job.

COR theory explains the endeavor of staff to maintain their emotional and mental resources, which are depleted when exposed to a toxic leader, leading to higher stress levels and uncivil behaviors at work (Koltz et al., 2021). Toxic culture at work steers employees towards burnout and dissatisfaction as it prevents them from replenishing their resources, which is supported by the current findings. This answers the questions posed in this study regarding the negative and detrimental effects of toxic leaders in the academic sector of the Middle East, where job satisfaction and trust are jeopardized, and thus, the wellbeing of academic staff is harmed. This can also be linked to the hierarchical and collectivist cultures in the region that further encourages such leadership behaviors (Tariq & Ding, 2022).

5. Conclusions

The current research focuses on the importance of job satisfaction as a vital element for the wellbeing of academic staff. This is particularly analyzed in the presence of toxic leaders, who evidently have dire negative impacts on the psychological factors of their employees as well as the physical and environmental factors of the workplace (i.e., organizational culture). In this respect, the current findings show how trust can be diminished in the presence of toxic leaders as they spread toxins via their behaviors that can be abusive, unethical, and authoritarian. These characteristics impact how the organization conducts tasks internally and infuse the workplace with unethical means of conduct that yield a lack of trust and jeopardize wellbeing due to stress, anxiety, and other issues such as conflict or burnout. It is important to note that similar findings have been reported in the extant literature, which support the current results (A. Alanezi, 2024; Mergen & Ozbilgin, 2021; Saleem et al., 2021; Smith & Fredricks-Lowman, 2020). Notably, the current research contributes to the literature of leadership and its impacts on employees' psychological wellbeing by obtaining empirical evidence that addresses the issue. It is also important to note that there are other studies that, while examining different factors, show consensus with current results in terms of the impact of COVID-19 on academic staff and its negative psychological outcomes (e.g., Agha, 2021; Bingham & Bubb, 2021; Telyani et al., 2021; Khawand & Zargar, 2022; Koo et al., 2022; Simard & Parent-Lamarche, 2022). This research focuses on job satisfaction of academic staff under the supervision of toxic leaders among Middle Eastern universities. Following what was mentioned, there are theoretical and practical implications that can be derived from current findings. These are highlighted in the following sections.

6. Theoretical Implications

As social exchange theory is included in the current context, it can be observed that toxic leaders are incapable of being appropriate role models for their followers, which is inherent in their behavior. This is further combined with the narcissistic, abusive, self-promoting, unpredictable, and controlling nature of toxic leaders. It is argued that social exchange does not occur under toxic leadership, or it occurs in a negative manner (Saleem et al., 2021; A. Alanezi, 2024; Mergen & Ozbilgin, 2021; Bandura, 1977; Zhou et al., 2021). This is further linked to the psychological wellbeing of employees as they are under pressure from a leader who, with the aforementioned characteristics, negatively impacts the workplace and individuals' work processes. Various negative outcomes, such as burnout, stress, lack of motivation and engagement, and turnover, can occur due to the toxic behavior of leaders in an academic setting. This is also related to the context of COR theory, which entails experiencing stress due to a perceived lack of abilities or resources, whether mental or physical. As toxic leaders can request unreasonable tasks

or deadlines, employees can feel stress, which directly affects their job satisfaction and wellbeing.

The effect of toxic leaders on organizational culture (i.e., environment, mission, socialization, information, and strategy) is vividly impactful on available resources for staff in a highly demanding sector (i.e., education). Arguably, an unethical, unhealthy, and devalued organizational culture is highly influential on the job satisfaction of employees, particularly in an academic setting. This implies that commitment, engagement, interactions among staff (and to extension among staff and students) and their trust are hindered through the existence of toxic leaders and their significant influence on organizational culture and trust (Winn & Dykes, 2019; Rasool et al., 2020; Saleem et al., 2021; Oden et al., 2019). Lastly, the LMX theory that is embedded in the current study pertains to the element of trust based on interactions between the leader and each employee. The current results show that toxic leaders can lower trust as their negative approach and characteristics lead to undesirable psychological outcomes for individuals. As mentioned earlier, interactions between toxic leaders and their subordinates can be hostile, abusive, one-sided, and stress-inducing. This, in turn, leads to an environment (i.e., workplace) where trust cannot manifest as socialization, and the flow of information in the organization is negatively influenced by the toxic behavior of the leader. Similar results have been noted throughout the extant literature from different perspectives and contexts (e.g., Behery et al., 2019; Matos et al., 2018; Winn & Dykes, 2019; Milosevic et al., 2020; Harris & Jones, 2018; Labrague et al., 2020). The current research provides empirical evidence about toxic leaders and their impact on the psychological wellbeing of academic staff, which contributes to the literature of leadership, organizational behavior, and culture. Furthermore, there are several aspects drawn from current findings that can be beneficial for practitioners, which are mentioned in the following section.

7. Practical Implications

The current research shows how negatively influential toxic leaders can be within the academic setting and particularly, during and after a crisis (i.e., COVID-19 pandemic), which has had severe impacts on both physical and psychological domains of human lives. Notably, it can be argued that organizations' decision-makers in universities have a responsibility to first identify any toxic leader in their companies to ensure that the damage is ceased. Importantly, as toxic leaders deeply impact organizational culture in their workplace through bad role modeling and abusive behavior, it becomes a significant challenge for new leaders to change the environment and create a healthy workplace for their staff. Thus, academic organizations should provide the equipment and means necessary to implement change management after eliminating a toxic leader. This pertains to the importance of organizational culture, which was noted in the current research. Additionally, organizations should focus on developing managers by enhancing their work environment. This can be achieved and boosted via Human Resource Management initiatives that address employees' overall wellbeing and personal and professional development.

To provide additional support during crises, universities can provide training and counseling services to their staff to reduce stress and anxiety and enhance wellbeing both physically and psychologically. University decision-makers can also focus on training new leaders who understand the goals of the organization and conduct their roles under ethical means. This can have long-term benefits for the organization and impact its trust-building process with employees. Due to the dire effects of toxic leaders on trust, it becomes imperative that commitment, loyalty, engagement, and citizenship behaviors are taken into consideration in creating new strategies for employees. This can establish an environment where toxins remaining from the toxic leader can be removed, and, thus, the job satisfaction

of academic staff is raised. In turn, this yields a more positive educational atmosphere for students and their learning process.

Implementation of development programs that emphasize ethical and constructive leadership practices is a necessity for Middle Eastern universities. The boards are to establish policies that help to identify and mitigate toxic traits in the managerial and leadership levels so that administrative staff and faculty members are provided with an environment of freedom, innovation, and professional development. Transparent policies and practices, and trust-building initiatives with open communication between leaders and staff can also be a major element for improving the workplace and detoxifying the organization. Leaders should be evaluated, and their behaviors should be monitored to avoid promoting and motivating toxic traits. Interventions, mentorship programs, and coaching can be the means for restoring the organizational culture into a healthy workplace by considering the organizational culture and trust in leaders as mediating elements. Through such actions, not only can the job satisfaction of the academic staff be improved, but further academic standards can be enhanced to serve the students and the nation.

8. Limitations and Recommendations

The current research is limited by several factors, which, although constraining the conduct of this study, open new pathways for other scholars to examine the subject in the future. These are namely (a) the quantitative nature of the data is limited in terms of accuracy of the data and generalizability, which can be complemented by qualitative studies that gather in-depth data; (b) the data were collected in a cross-sectional manner, and thus, we are unable to determine the temporal link among variables, which can be addressed by longitudinal studies in the future that address changes in time (pre and post toxic leaders) in academic or other settings; (c) limited number of existing pieces of literature on the subject and particularly, in the context of Middle East, which calls for further analyses and research in the region to provide comparative results; (d) several theories that are linked to the current context are not included (e.g., vertical dyad linkage theory, chaos theory, social identity theory, and commitment–trust theory), which can be included in future studies pertaining to the current issue; and (e) cultural elements are not included in the current research as they fall beyond its scope of conduct. The effect and importance of cultural differences can be addressed by future studies to further contribute to the current understanding of toxic leaders and the psychological wellbeing of their employees.

In addition to what was noted, the sample of academic staff limits the generalizability of the findings to other sectors and regions, which can be addressed by future studies to understand whether similar patterns emerge in different cultural and/or organizational contexts. Furthermore, response bias of self-reported data should be addressed, which can be avoided through longitudinal studies with objective measures for performance assessment and the effects of toxic leadership on the wellbeing of employees over time. Moderating factors such as resilience, coping mechanisms, and individual characteristics are not included in the current model, which can be explored by future studies to reveal the influences of personality, emotional intelligence, and the ability of staff to cope with and navigate a toxic workplace. Lastly, remote or hybrid workplaces are increasingly deployed in the academic sector. Future studies can examine the manifestation of toxic leadership in virtual workplaces and their impact on employee performance, wellbeing, and other behavioral outcomes.

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Article

Exploring the Mystery of Relational Capital in an Organizational Context

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Abstract: The relational perspective is a fundamental theoretical approach to understanding the actions of humans and organizations as they interact with others to survive. The concept of relational capital is used in management and strategic literature to highlight the importance of agents' interdependence. This paper aims to identify the dimensions of relational capital and their variables within the intraorganizational context, analyzing the importance of organizational management. This is qualitative research. Participant observation, 27 face-to-face semi-structured interviews, and principles of grounded theory were used to collect and analyze qualitative data. By breaking down RC into a more comprehensive concept, this study offers clear evidence of the identification and definition of two-dimensional, multivariable relational capital. Although these two dimensions and their variables are analytically separate, in this research, it is recognized that, in fact, they are highly interrelated. The research can be beneficial for those interested in the improvement of our organizations and society through the development and maintenance of mutual gain relationships over time.

Keywords: relational capital; intrafirm context; qualitative research

1. Introduction

The social nature of human beings is related to interdependent interactions with other agents. This relational characteristic of interdependence is the basis of every system, such as an organization. Thus, analyzing and studying the logic and nature of relationships is fundamental to improving our understanding of organizations. According to some authors (Palmer, 1997; Chatman, 1991; Schneider, 1987), humans are the principal agents in organizations since it is through their interdependent relationships that critical processes, such as information exchange, knowledge development, and organizational learning, are established and developed.

From an analysis of the organizational management literature, relational capital (RC) can be understood as the ability of an agent to positively interact with other agents, and it is characterized in terms of some components. To understand the RC concept, two approaches have been developed by authors. These operate at the interorganizational and industry level (macro) (Kale et al., 2000; Sarkar et al., 2001; Dhanaraj et al., 2004; Collins & Hitt, 2006; Castro et al., 2004; Delerue-Vidot, 2006; Johnson, 1999) and the intraorganizational level (micro), which includes the analysis of strategic processes and the analysis of relationships

between people inside organizations (Hayer & Ibeh, 2006; Yan et al., 2019; Inkpen & Tsang, 2005; Moran, 2005; Dwyer et al., 1987; Tsai & Ghoshal, 1998; Wasko & Faraj, 2005; Coleman, 1988; Wang et al., 2014; Rodríguez-Aceves et al., 2023; Granovetter, 1973).

The main objective of this paper is to provide a more comprehensive view of the RC concept via micro-level analysis. To accomplish this, we propose a grounded definition of RC and its components (dimensions and variables) within an intrafirm business unit's context, contributing to the development of a more concrete and operational concept. In this sense, this paper extends the RC literature by disentangling the elements, dimensions, and variables that represent this concept. In addition, this research improves our understanding of human interactions at the level of intrafirm business units.

This article is organized as follows. The first section discusses the theoretical background of RC. The second highlights the research methodology and a brief description of the context of the study is presented, along with the methods and procedures employed for data collection and analysis. The findings of the research are introduced in the third section. The fourth section discusses the findings in relation to the relevant literature and gives the theoretical contributions. Conclusions are presented in the final section, where research implications, limitations, and potential areas of further research are proposed.

2. Literature Review

2.1. Relational Perspective

The relational perspective assumes that relationships are important because they are the means through which agents exchange and distribute elements of value. The basic idea that the elements of organizations are interconnected and interdependent is the principal assumption in this approach. Relationships not only allow for the exchange of elements of value between social agents, but they also support key organizational processes. Some theoretical contributions (e.g., Vasileiadou, 2012) consider that the study of collaborative relationships between agents within an organization is fundamental to explaining the functioning and performance of these organizations. This relational view assumes that, to improve their performance, organizations need to collaborate with other economic and social actors (Dyer & Singh, 1998; Topal, 2015).

In organizational studies, the use of concepts such as social capital (Chang, 2020; Adler & Kwon, 2002; Bourdieu, 1986; Coleman, 1988; Inkpen & Tsang, 2005; Farr, 2004; McFadyen & Cannella, 2004; Mikovic et al., 2019; Moran, 2005; Nahapiet & Ghoshal, 1998; Portes, 1998, 2000; Robertson et al., 2019; Weerakoon et al., 2019; Nicholson et al., 2004), collaborative advantage (Huxham, 1996), social networks (Rosenthal, 1997; Scott, 2009; Wasserman & Faust, 2009; Kilduff & Tsai, 2007), network relationships (Hsiao, 2019), knowledge networks (Du Preez et al., 2008; Phelps et al., 2012), network paradigms (Borgatti & Foster, 2003; Nonino, 2013), networks of practice (Soekijad et al., 2011), communities of practice (Lesser & Everest, 2001; Wenger, 1998; Wenger & Snyder, 2000), co-operative and mutual enterprise business models (Mazzarol et al., 2018), interdependence in knowledge integration (Chia-Yu, 2019), knowledge collaboration and knowledge sharing (Adarsh, 2018; Chen et al., 2018; Cheng & Chang, 2019; Han & Pashouwers, 2018; Phong & Hui, 2018), and relational capability (Weng & Huang, 2012), among others, provides evidence of the growing theorization about a relational perspective on organizations.

The following section discusses the concept of RC and its components.

2.2. Relational Capital (RC)

In the literature about relational capital, proposals can be found that address the concept at two different levels of analysis at least. The interorganizational and industry-

level (macro) and the intraorganizational level (micro) include the analysis of strategic processes and the analysis of relationships between people inside organizations.

With respect to macro-level proposals, authors such as Bontis et al. (2000) insist that RC is considered to be the knowledge embedded in the relation to stakeholders and its relevant value. In this regard, some other authors like Kianto et al. (2013) and Johnson (1999) argue that RC relates to the ability of an organization to interact with external stakeholders and business community members in a positive manner in order to stimulate the potential for wealth creation. Welbourne and Pardo-del-Val (2009), for example, use relational capital, from a macro-level perspective, to understand relationships between organizations as well as to identify the benefits of collaboration among firms and the value of such relationships (Pierre, 2010; Cegarra-Navarro et al., 2021). At the industry and inter-organizational levels, RC research primarily focuses on the study of processes of negotiation and collaborative agreements (Welbourne & Pardo-del-Val, 2009); the role of opportunism, commitment, and the protection of proprietary assets in strategic alliances (Kale et al., 2000; Delerue-Vidot, 2006; Aaltonen & Turkulainen, 2018); the role of firm competitiveness and performance (Mohammad et al., 2024; Corvino et al., 2019); the importance of corporate reputation (Castro et al., 2004); the value derived from the relationship between a business and its external stakeholders (Onge, 1996); the level of software and technological innovation capability (Madhavaram et al., 2023; Ryu et al., 2021; Durst et al., 2024); and the value creation and the transfer of tacit and explicit knowledge in alliances and joint ventures (Sarkar et al., 2001; Dhanaraj et al., 2004; Collins & Hitt, 2006).

On the other hand, with respect to micro-level proposals, authors such as Cousins et al. (2006) and De Silva et al. (2024) associate RC with strategic processes within organizations, such as informal and formal socialization processes. Some other organizational attributes associated with RC are peripheral vision in the business environment and technology-related knowledge and absorptive capacity (Cegarra-Navarro et al., 2016), financial performance (Iazzolino et al., 2018), library service assessment (Bracke, 2016), the creation of knowledge as a source of organizational advantages (Nahapiet & Ghoshal, 1998), learning across the exchange interface (Kale et al., 2000), and the identification of dimensions and measures that can be used to evaluate buyer–supplier relationships (Ocicka & Wieteska, 2019).

In this paper, we pay particular attention to the proposals that address relational capital at the individual level. That is, we focus on the explanatory power of this concept, linked to nature, and the dimensions and variables that characterize the relationships between people that are established within organizations. In this case, RC is used to study the increase in knowledge and expertise within organizations (Hayer & Ibeh, 2006) and the structural power of CEOs (Yan et al., 2019). At this level of analysis, some variables are studied to understand and measure the quality of relationships between people inside organizations. Among the most important factors, we find mutual trust (Inkpen & Tsang, 2005; Moran, 2005; Tsai & Ghoshal, 1998), mutual reciprocity and commitment (Dwyer et al., 1987; Tsai & Ghoshal, 1998; Wasko & Faraj, 2005), norms and sanctions (Coleman, 1988; Wang et al., 2014; Rodríguez-Aceves et al., 2023), and tie strength (Granovetter, 1973; Tsai & Ghoshal, 1998). Our interpretation of RC in this work is derived from two approaches. First is the concept that Nahapiet and Ghoshal (1998) proposed, in which RC refers to those assets created and leveraged through relationships, and second is the concept that Rivera and Carrillo (2016) proposed, in which RC is represented by the quality or value of relationships that agents maintain with other agents in their environment. It is important to mention that the conception that we explore in this work only contemplates one of the three components of social capital (relational capital) and leaves structural capital and cognitive capital out of the analysis (Carr et al., 2011). In this study, we aim to provide a more comprehensive explanation of the main components (dimensions and variables)

of RC at the individual level. Rivera and Carrillo (2016), working based on Carrillo's characterization of K-events (Carrillo, 2002, p. 379), proposed an RC framework that states that the quality of the relationship between two agents relies on the development and measurement of certain combinations of components. According to these authors, the quality or value of relationships that agents maintain with other agents in their environment relies on contextual conditions, object characteristics, and the agent's perception. From the theoretical contributions presented above, it can be argued that the measurement of RC represents a complex task to perform and scholars from different disciplines have used different variables at different levels of analysis to carry it out. To our knowledge, none of these studies have focused on disentangling RC from a qualitative approach, and achieving this is precisely one of the strengths of our paper. From our point of view, there is sufficient opportunity to extend current research on RC understanding, conceptualization, and measurement, offering a more comprehensive explanation of its main and essential components. This paper investigates the dynamics between people in the intraorganizational context to analyze the nature of their relationships at the individual level of analysis.

The following section justifies the selection of the research methodology and describes how the different techniques and strategies shape an embedded single-case study.

3. Methodology

This study principally aims to answer the following question: What are the dimensions and variables of RC?

This study follows a qualitative approach to data collection and analysis to understand people's experiences regarding the establishment and development of their relationships in an organizational context. Although both positivist and interpretive traditions are concerned with the individual's point of view, we believe that detailed interviewing (Denzin & Lincoln, 2005) allows us to become closer to the participants' perspectives. Interviews are complemented with participant observation and we are thus able to interpret the meanings that interviewees assign to their world (Creswell, 2007). To achieve this, this research empowers individuals to share their stories, listen, and present different interpretations of research participants with regard to the subject-under-investigation phenomenon.

3.1. Research Site

The research focuses on two intrafirm business units of a manufacturing group, integrating five business units. As shown in Figure 1, not all BUs of the industrial group are related.

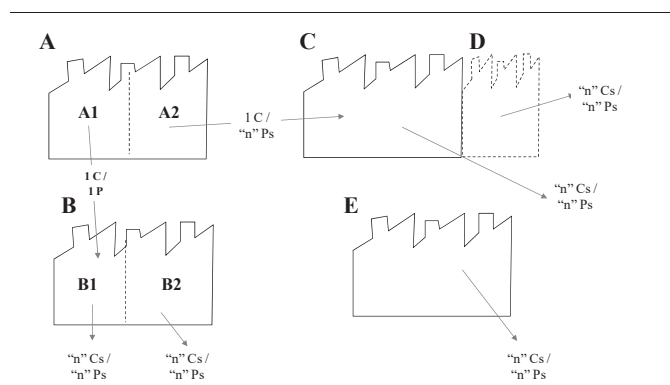


Figure 1. The business units under research and the industrial group. (A–E): different business units of the industrial group; 1C: one customer; 1P: one product; “n”Ps: several products; “n”Cs: several customers.

Given the interest of the researchers in identifying the dimensions and variables of relational capital, this research solely focuses on those relationships established by individuals from business units A1 and B1. A1 supplies different raw materials to B1. Constant communication and coordination between employees from the two BUs are necessary for the successful completion and delivery of products to final customers (see Figure 2).

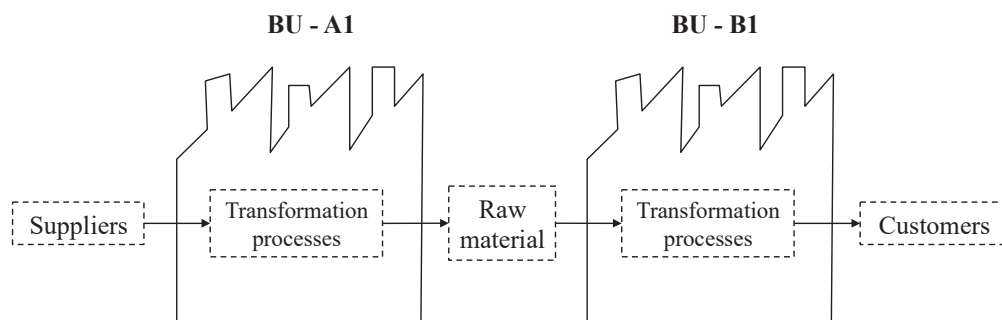


Figure 2. Dependence of production supply chain between business units A1 and B1.

These business units were chosen for three main reasons. As BU-A1 supplies raw material to BU-B1, the members of business units are expected to collaborate. This in turn proves to be a good research setting with which to analyze the quality of relationships between them. Yin (2003) suggests the adoption of a single case design (embedded in this research) when the case is representative or typical. The researchers believe this case to be typical of many other manufacturing business units (official classification; size; type; hierarchical structure; design, operation, and control of their operative, strategic, and support processes). Finally, and very pragmatically, the researchers obtained guaranteed access to the informants and complete support for the research.

The relationships established between staff from the two business units are critical for the proper functioning of both given the operational and administrative interdependence of their processes. Proper BU operation relies on four interconnected processes: (1) BU production programs; (2) BU product quality monitoring; (3) the requisition of purchasing and supply of raw materials in BU; and (4) various administrative activities and procedures (payroll, insurance, recruitment of staff, union issues). In these four processes, employees from both BUs are actively working together and communicating with each other. Frequent face-to-face interactions, occurring during formal and informal discussions and meetings, support these coordination activities.

Key actors were identified in the two BUs based on formal and informal interviews and talks, meetings, company records (purchase, sales, and consignment invoices and notes; production schedules; administrative and operative memos; legal and administrative procedures; some e-mails and telephone calls), and the daily observation of the activities taking place at the two BUs. In sum, 27 key actors were identified: 9 were from BU-A1 and 18 were from BU-B1. The relationships developed between key actors are manifested in different hierarchical levels. To ensure the reliability of the sample of the key actors selected, 30% random selection of the remaining members of each BU was performed (7 people from A1 and 24 people from B1) and we asked each member if they had any relationship with people from the other BU. In all cases, the answer was no. Moreover, during informal interviews and talks, the researchers asked all members if they had any relationship with another person from the other BU and in all cases the answers were also negative.

3.2. Research Design

A multi-method research approach allowed the researchers to capture a more complete, integrative, holistic, and contextual picture of the situation (Denzin & Lincoln, 2005; Jick, 1979). Thus, the use of triangulation helps researchers understand the phenomenon under investigation because of the complementary nature of methods and the convergence and correspondence of research findings (Denzin & Lincoln, 2005; Greene et al., 1989; Hammersley & Atkinson, 1995; Patton, 2002).

Given the nature of this research, a grounded theory approach was used to identify and define the dimensions and variables of the concept of RC. Informal interviews and participant observation were also conducted. After developing an initial understanding of the phenomenon, 27 semi-structured interviews were developed, recorded, transcribed verbatim, and analyzed. From this phase, RC dimensions and variables emerged.

3.3. Data Collection

In order to collect data, participant observation and semi-structured interviews were conducted. Observation is important because it allows data collection about a specific phenomenon or situation in a “naturally occurring context” (Silverman, 2006) via the observation of and listening to the interaction or phenomenon as it takes place (Kumar, 2005). According to Jorgensen (1989, p. 12), the participant observation methodology is exceptional for studying processes, relationships among people and events, the events affecting the organization and people, continuities over time, and patterns. For 7 months, we undertook weekly periods of observation during field visits, performed at 15 h per week per business unit, to gain access to the inside view of informants in order to understand their “life experiences” when involved in interdependence activities. Additionally, field notes were taken, schemes and diagrams were recorded, and informal conversations and meetings took place with actors in the two business units. These field notes, schemes, and diagrams helped the researchers to understand some of the activities, processes, relationships, and conditions were observed during the research.

The researchers had dozens of informal conversations with the majority of key actors within the two business units. The content of these conversations varied widely, since people’s activities and functions vary a lot. These conversations helped the researchers to enhance their understanding of the research context. After two months of participant observation, the researchers were allowed to attend some other meetings on planning and coordination processes in both business units.

Interviews are one of the most commonly recognized forms of qualitative research methods (Mason, 1998, p. 39) and they provide an effective method “to get the interview subject to talk a lot—openly, trustfully, honestly, clearly, and freely—about what the researcher is interested in” (Alvesson, 2003, p. 17).

Twenty-seven face-to-face semi-structured in-depth interviews (Mishler, 1986; Chirban, 1996; Marshall & Rossman, 1999; Bernard, 2002) were conducted with key members of the two business units. This kind of interview allows for open-ended questions and “enables the researchers to understand and capture the points of view of other people without predetermining those points of view through prior selection of questionnaire categories” (Patton, 2002, p. 21), thus, giving “voice to common people, allowing them to freely present their life situations in their own words” (Kvale, 2006, p. 481). With this method, the expectation was to understand the viewpoints of the participants and explore the meanings they attribute to their experiences, understanding, and views about the RC components. Despite the theoretical contributions linked to the variables and dimensions of RC, the authors consider that these contributions have not deeply explored the complexity of the components that influence the relationships established between agents at the micro

level. This is why the design of the semi-structured in-depth interview uses open questions that allow participants to not limit their responses to the components that have already been theoretically identified. Because the semi-structured style of interviewing requires a rigorous set of activities in order to be a feasible method (Mason, 1998), all interviews were applied in similar conditions and the process followed a homogeneous procedure. This procedure was based on the researchers' previous experience, as well as on some authors' recommendations (Patton, 2002; Brenner, 1985; Mack et al., 2005; Mason, 2002). The researchers considered some important aspects before (planning), during (the interview), and after the interviews. Interviews were recorded and fully transcribed verbatim by the researchers. This activity enabled the researchers to be more fully immersed in the research context. Hence, it enabled a better interpretation of a participant's point of view, and it also helped the researchers to prepare for the next interview. The process of transcription included careful listening to the recording, after which it was transcribed in sections to ensure accuracy. The interviews lasted 40 min on average.

The focus of the interview was on the agent's perceptions and viewpoints about what they saw as critical dimensions and variables of RC. The interviews gave participants the possibility of introducing examples and their own experiences. The semi-structured interview script was designed and informed by the participant observation stage (see Appendix A).

3.4. Data Analysis

As mentioned before, grounded theory was adopted for the analysis of the interviews. Basically, one of the most important aspects of grounded theory is the coding stage, which aims to find patterns or themes within qualitative data. Some specific steps were followed to systematically find those patterns: a transcript stage, a data familiarization stage, a code generation stage, category and subcategory identification, a reviewing and refining stage, and stage for reporting findings.

Data familiarization consisted of becoming familiar with the data through immersion. This process was conducted by reading and re-reading the transcripts and by comparing the transcript with the actual recorded interviews to ensure the accuracy of the transcript. Code generation was the next step after the analysis of the interviews. For each interview, a preliminary analysis was carried out, using Microsoft Word, in which important words were highlighted.

By reading the interviews several times, notes, words, and phrases were highlighted. The process of creating themes was based on an iterative open, axial, and selective coding. In this stage, an "interpretative reading" (Mason, 2002) of all the interviews was carried out to better understand the meaning of participants' views by going beyond the participants' actual words. To guarantee the homogeneity of coding criteria, coding was constantly compared and validated at monthly meetings with experts in the social and relational capital area. Disagreements were reconciled through discussion.

Following guidelines for inductive research, after transcribing all the interviews, the researchers looked for common codes and categories throughout the interviews, reviewing and refining these categories and subcategories by comparing and contrasting the data across the entire set. To support the practice of comparative analysis, this research adopted two practical tools: a free list of ideas and quotations.

At the beginning of this process, we made a free list of common ideas, concepts, and themes. The researchers eliminated the repetitive ideas from this list, and then similar codes and themes were grouped together, leading to the construction of meaningful categories. Special attention was focused on comparisons of the similarities and differences identified by the various interview participants. To confirm the categories and subcategories that

emerged from data, and to guarantee their validity, findings were constantly discussed at meetings with experts and with key actors involved in the study. As in the code generation stage, disagreements were reconciled through discussion.

Moreover, data provided by participant observation also allowed the confirmatory evidence bias to be minimized and validity to be improved. These data also provided further confirmation and illustration of the categories and subcategories that emerged. In this study, according to theoretical saturation rules, theoretical saturation was considered achieved when no new open codes emerged from data, when the properties of individual categories were seen as being explainable by the social phenomenon reflected in data, and when the relationships between categories and subcategories were examined and confirmed by checking with the data.

3.5. Ethical Considerations

Before the data collection stage, all participants were informed of the purposes of the research and issues around confidentiality, their freedom to withdraw at any time, and the details of data storage, data access, and anonymity.

It was explained that all recorded transcripts of interviews were kept strictly confidential and were used in this research only. All interview questions were carefully designed, not only for the purpose of theory development, but also with the aim of protecting the privacy of individual participants. In both the data analysis and findings report stages, the identities of participants and business units were not revealed. A code of participants and business unit's names that included one letter and one number was created. These codes were used during these stages and participants' as well as business units' real names were kept in a separate file. All data were stored securely in the researcher's computer in a password-protected folder.

3.6. Quality of the Research

Following the lead of some authors (Strauss & Corbin, 1998; Patton, 2002; Lietz et al., 2006; Creswell, 2009), in this study, the researchers employed multiple strategies to establish trustworthiness and minimize the risk of avoidable errors. These strategies included triangulation, flexibility, member checking, peer debriefing, audit trailing, and the resolution of time and data collection instrument issues.

4. Findings

This section introduces findings regarding relational capital dimensions and variables that emerged from this research. For this purpose, the researchers adopted an iterative approach (Strauss & Corbin, 1998) of comparing and contrasting the data to build a grounded theory. The researchers constantly shuttled between the field notes, semi-structured interviews, and the theoretical framework that they were building to find support for their theorization and to detect any inconsistencies between intuitions and data.

During the research, two broad dimensions emerged and these helped us to characterize relational capital. The first dimension is labeled the agent dimension, and this refers to behaviors that can be attributed to a particular person, as perceived by others. This dimension in turn consists of 12 variables. Each of these variables relates to behaviors that enhance the quality of a relation between people from different business units.

The second dimension is labeled the context dimension and refers to the general perception of the atmosphere that prevails in the two business units with respect to some general conditions. It refers to situations that involve agreements, rules, norms, communication, and hierarchies, among other factors. It consists of 7 variables. Figure 3 shows the basic scheme of these two dimensions.

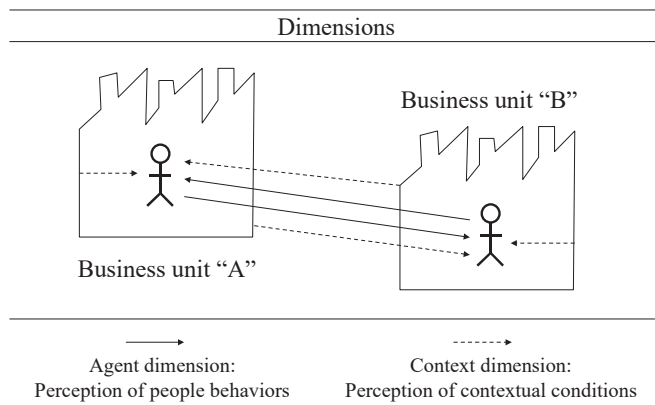


Figure 3. RC dimensions.

Figure 4 shows the key dimensions and variables of RC.

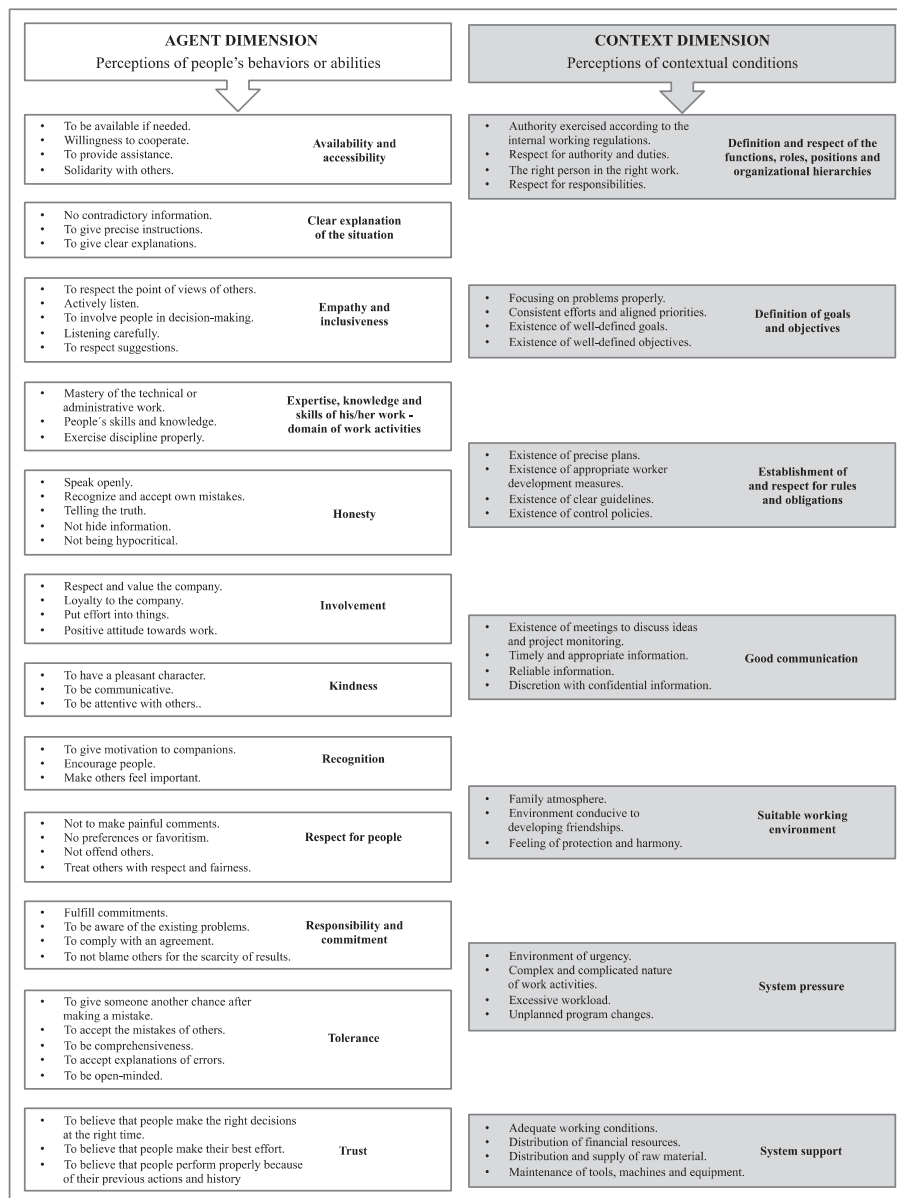


Figure 4. Dimensions and variables of RC. Note: listed in alphabetical order.

4.1. Agent Dimension

Availability and accessibility: An important variable for establishing quality relationships between employees from the two business units is a willingness to show availability and accessibility to others. This was shown by behaviors such as providing help and support to colleagues, showing willingness to cooperate, and solidarity with others. Moreover, the presence of this readiness to help others seems to be very important in the development of problem solving and in achieving the goals and objectives of business units. It is also fair to say that the lack of these features sometimes hampers relationships and the accomplishment of objectives by both business units.

Clear explanations: Participants value when other colleagues have the ability to give clear explanations of situations, whether operational or administrative, so that they can be solved properly. Due to the nature of the processes and activities of both business units, people must give precise instructions to each other to accomplish the objectives and goals of the company, and must also not provide contradictory information that may lead to confusion when addressing problems.

Empathy and inclusiveness: People consider the practice of respecting the opinions of others to be very important as it allows ideas to flow, agreements to be established, and decisions to be made. Participation by and knowledge from all contribute to a process of joint decision-making, in which suggestions and priorities from others, as well as listening to their proposals, are essential to maintain good working relationships and to achieve desirable objectives.

Expertise, knowledge, and skills: Mastering technical and administrative work-related activities is another important factor in establishing quality relationships. This can be achieved when constant discipline is developed to respond to the requirements of processes taking place in the business units. This in turn ensures that the work carried out will be suitable and that conflicts or frictions resulting from the lack of professionalism will be reduced. On the other hand, some participants argued that problems may arise when people do not master their technical and administrative activities.

Honesty: The variable of honesty was mentioned several times by participants as a key factor influencing the quality of relationships. This can be achieved by speaking openly, acknowledging mistakes, and not hiding information.

Involvement: Having a positive attitude towards work and the company involves employees seeking the development of quality relationships. Knowing which people are involved and which are not is very important for establishing and maintaining quality relationships between them. From the perspective of interviewees, the lack of involvement affects relationships because people do not pull their weight at work and do not have love for the company.

Kindness: There were several respondents who mentioned kindness as an essential ingredient in maintaining quality relationships. This kindness depends to some extent on people's involvement in a particular relationship, such as showing someone's disposition to be attentive to others. Moreover, there were several participants who mentioned that when people have hard-boiled, obstinate personalities, quality relationships cannot be established or developed.

Recognition: The disposition of people to make others feel important, to give words of encouragement, and to drive and motivate their peers is important when establishing and maintaining quality relationships. Some of the key actors in this research commented that good relationships are developed between people when they have the ability to offer words of encouragement and support to their peers in work situations. According to interviewees, in the business units, there is a need to boost recognition, which is critical for establishing quality relationships.

Respect for people: The existence of an attitude of respect for people and fairness is very important to maintain and develop quality relationships. Moreover, when persons have not been polite for any reason, the quality of relations tends to decrease.

Responsibility and commitment: Given the resource dependence between business units, respect for administrative scheduling and for agreements made is very important for maintaining cordial relationships. The establishment of commitments is typically developed in meetings routinely held in the business units. However, there is evidence that shows that there are situations that compromise establishing commitments, stemming from a lack of responsibility and commitment on the part of people and the cancelation of some of the meetings.

Tolerance: Some participants commented that tolerance is essential for the proper development of quality relationships. In this regard, the greater the tolerance between people, the better the quality of relationships between them. From the participant perspective, being tolerant requires people to have the disposition not to despair with people, to be understanding, to be open-minded, not to be stubborn and not to impose things on others, to accept others' mistakes and explanations, and to give colleagues another chance after making a mistake. Moreover, the lack of tolerance, exemplified by the imposition of ideas and narrow criteria in decision-making, sometimes deteriorates relationships and even prevents the achievement of the business units' objectives and goals.

Trust: Trust strengthens ties between people over time and promotes good relationships between them. It is derived from decisions taken by people over time and is supported by actions and past performance and therefore generates positive feelings that have an impact on people's willingness to develop a relationship. In this study, trust also refers to the someone's beliefs that others make their best effort and the right decisions at the right time. Moreover, a loss of trust complicates the relationships between the staff of both business units.

Some evidence associated with each variable of agent dimension is presented in Table 1.

Table 1. Evidence associated with variables of agent dimension.

Agent Dimension
Availability and accessibility
If it's missing to cover an area and that depends on you, why not help? That's why we are here on business units, it is the same company. I have always said that no matter where we are placed, the important thing is to help, we have to be available, what we want is to finish the job because we all are benefit, is the same company, we all work with the same company. (Interviewee B-2, lines 280–287)
There has always been an impetus for cooperation, at least when I've needed something or when I ask or someone ask me for support, we help each other. (Interviewee B-9, lines 182–184)
Clear and precise explanations
To avoid problems between the two business units in operational and administrative issues the supervisors from here [B1] were sent to there [A1] in weekly periods with the purpose of speak the same language, using the same terms. The idea was to speak the same language and know the process of A1. (Interviewee B-15, lines 415–418)
When there is a situation, I explain what is exactly needed and why it is urgent. (Interviewee A-3, lines 507–508)

Table 1. Cont.

Agent Dimension
Empathy and inclusiveness
When there is a problem, I try to improve the relationships bringing closer to the parts involved, as I see it, every opinion has transcendence. I try to ask for the information of one of the parts, and then the other part, and finally we gather to have an agreement. (Interviewee B-11, lines 99–102)
I know many people of both business units and I get involve with everybody. I always listen, mainly I listen. When I establish my relationships with persons I usually listen to their situations and I think they listen to me, too. I feel it is like that, for me, it is like that, and that's why I hardly ever get in conflict with them. (Interviewee A-3, lines 277–282)
Expertise, knowledge and skills of his/her work—domain of work activitiesAnother important feature to have good relationships is the knowledge of your area, your function. You have to solve the function and know how works each thing that you do in order to respond for them and to resolve them. (Interviewee A-3, lines 243–244)
We have people that despite their good will, their availability and their responsibility for doing things, lack of technical knowledge to solve important problems which are becoming more serious. I think sometimes we suffer from personal expertise to develop the full potential that the company has. (Interviewee B-3, lines 283–304)
Honesty
To have a good relationship I feel you always need to speak the truth. Never handle half-truths. (Interviewee B-4, lines 40–41)
The main thing in a good relationship is not to lie. (Interviewee B-8, line 129)
Involvement
I do this work because we are all involved here, because we all live here, because this is how the world moves. (Interviewee A-3, lines 339–341)
One of the strengths of A1 and B1 is that we are composed of pure hardworking people committed to this work. I think is hardly to find this kind of people in another place. I think if we haven't make an effort we would not be here. (Interviewee A-1, lines 217–219)
Kindness
You need to be fine to do the things right, arrive and say good morning, because a greeting counts a lot. (Interviewee A-5, lines 147–148)
I think the way as I get along with the staff here [A1] and from there [B1] is important because if you do not get along with them, or if you have no friends, may be they won't help me with the things that I need when I ask them. I get along well with them and I laugh with them. It's good to promote friendship. (Interviewee A-9, lines 38–47)
Recognition
I always try to tell my people that they are working very good, I congratulate them, and tell them they are doing a good job, I try to motivate them. (Interviewee B-13, lines 102–106)
My colleagues have told me that we needed to do this or we need to do that. I think that people need nice words, some extra motivation. Details matters and a little thing can have great impact on people's performance. (Interviewee B-15, lines 153–159)
Respect for people
I have always had the idea that regardless everything, even the most humble person deserves respect, because if you do not value people, things go wrong. (Interviewee B-4, lines 42–45)
To maintain a cordial and good relationship with people you must have a good behavior, if you treat them well, they are going to treat you well. A good behavior means to treat people well, without curses. I'm also strict and sometimes I have to call attention but not aggressively. (Interviewee A-5, lines 134–140)

Table 1. Cont.

Agent Dimension
Responsibility and commitment
I think that in order to have good relationships between us [A1 and B1] it is very important to make commitments and fulfill them (Interviewee A-1, lines 41–42)
One of the strengths of A1 is that they have faced many challenges even though they have problems. With all this shortcomings they have known how to solve their problems. That's a responsibility value that they have. (Interviewee B-10, lines 396–400)
Tolerance
You have to mediate people and then you have to give them opinions and options, you tell them how they have to work. We must accept that in life we are never perfect; there are many variables that change over time and we need to get adapted. (Interviewee B-10, lines 167–178)
A bad relationship exists when you arrive with a not opened provision to reach a point of agreement and you arrive at a more dictatorial or more energetic position without hearing the other point of view, I think it would be a bad relationship. (Interviewee B-5, lines 98–101)
Trust
I get along with them because there is trust; there is no anger with someone there. Trust means I can come and tell them if something is missing here or if we are not having any progress or anything. (Interviewee A-9, Lines 59–63)
Another feature that makes good relationships is trust. Previously the staff of A1 used to come here [B1] more often and they realized that things we told them were things that happened, then trust grew between us. They trusted in everything I told them. (Interviewee B-16, lines 207–211)

4.2. Context Dimension

Definition of and respect for organizational structures: The evidence suggests that once organizational structures are defined, and roles, responsibilities, and hierarchies respected, relationships among employees improve. By contrast, the lack of proper definitions of and respect for roles and responsibilities negatively affects the quality of relationships, causing internal friction. Although roles and responsibilities are formally assigned, sometimes these roles and the authority associated with them are not respected by people.

Definition of goals and objectives: The definition of goals and objectives clarifies the business units' efforts towards a particular situation. This fact makes it possible to solve conflicts that have seen the relationships between different actors in both business units deteriorate. People mentioned that two of the biggest problems in the business units and between them are the absence of well-defined objectives and goals and the lack of leadership on important organizational issues and decisions. During participant observation, it was clear that in some situations, the absence of these two aspects caused friction between employees from both business units and as a consequence harmed relationships.

Respect for rules and obligations: The establishment of and respect for rules and obligations are important for maintaining quality relationships. The existence of control policies and clear guidelines, as well as precise plans, allow for the development of activities in the organization. Moreover, participants of the two business units mentioned that many of the administrative and operative requirements and procedures are accomplished because of the existence of and respect for these rules and obligations. According to participants, the existence of rules, such as appropriate disciplinary measures, enables process improvement. However, the perception of the lack of rules in both business units allows people to act inappropriately, and in many cases this ends up affecting the quality of relationships.

Good communication: According to interviewees, one of the necessary conditions for the existence of good relationships between the two business units is good communication. From the interviewees' perspective, it is very important to have some sensitive information

treated as confidential if good relationships are to be maintained. However, this desire is truncated by gossip that compromises the quality of relationships.

Suitable work environment: One of the great virtues of business units, fostering the quality of relationships between them, is the existence of a suitable work environment. Some interviewees said that the work environment allowed them to establish quality relationships both personally and professionally. By contrast, the quality of relationships deteriorates if a negative working environment is perceived.

System pressure: Qualitative evidence supports the idea that relationships can be affected due to the organizational pressure that exists in both business units. The lack of time to address administrative or operational activities derived from the urgencies of orders or changes in production programs causes some relationships to deteriorate. Moreover, the evidence suggests that excess daily excess work results in the negation of some people's suggestions and needs. People become upset because they think that their company gives more priority to urgent issues than important ones.

System support: The adequate allocation of financial and technological resources would improve relationships between members from the two business units. When there is a scarcity of resources that are not under the control of employees from both business units, problems occur. As A1 depends on B1, when shortcomings are present, misunderstandings start to appear and therefore relationships between employees deteriorate over time. Similarly, inadequate equipment maintenance leads to frictions and discussions in both business units, and as a result it is impossible to conclude some production programs satisfactorily. This in turn negatively affects the establishment of good relationships.

Some evidence associated with each variable of context dimension is presented in Table 2.

Table 2. Evidence associated with variables of context dimension.

Context Dimension
Definition and respect for functions, roles, positions and organizational hierarchies
People from B1 should acknowledge that it is not possible for one person from [A1] to solve all problems. Solutions must be requested to the right person because one person alone cannot solve all situations. If I were they, I would ask the right question to the right person. Bad relationships and frictions have been developed because they [B1] demand results from people who are not directly involved in the process or problems they want to solve. (Interviewee A-4, lines 218–230)
One characteristic of good relationships has to do with recognition of the roles that people play within the business units. It is necessary both, to have the knowledge of the activity performed by each employee and to respect the boundaries delineated by defined responsibilities and functions of each position. (Interviewee B-11, lines 68–72)
Definition of goals and objectives
I think that we need a leader to give order and direction to our plans. If we all work together in the same direction, things would work much better. We lack of a person who can guide us. For me, all we need is a leader who clearly defines objectives and goals. A leader that goes ahead and says: faster, slower, turn right. (Interviewee B-8, lines 469–487)
I believe that we lack someone who guides us and helps us define the objectives of the business units. I think a lot of energy is dispersed in vain, trying to figure daily things out and sometimes at very high costs. It is necessary to focus all our efforts towards particular goals, but firstly we need to define those goals and objectives. We must define how far we want to go and what it takes to get there. (Interviewee B-3, lines 246–255)
Establishment of and respect for rules and obligations
We need rules and internal control to improve our relationships. I think it could greatly improve the internal control. We could develop internal control policies to improve the information flow and that there is no duplication of work. (Interviewee B-9, lines 228–253)

Table 2. Cont.

Context Dimension
Everyone sees A1 as a simple factory in which there are no rules, people do whatever they want. I think that business unit A1 must have more rules to have better relationships. (Interviewee A-4, lines 298–299)
Good communication
Communication is very important in all senses. We all need to be on harmony in order to do our best. Many differences can appear, but communication will help us understand diminish those differences. We need to listen to the people more than anything else. (Interviewee B-4, lines 197–200)
I think there are things that happen in business units that we don't need to know. For example, if B1 has some financial or labor problems, we don't really need to know about it, because that information can be misunderstood. I believe that both business units must be more discrete about sensitive aspects because this information affects people's performance. A lot of information is filtered from B1 to A1, and that is not good. (Interviewee A-1, lines 171–180)
Suitable working environment
The environment we have here at the company has allow us to develop and maintain good relationships. This is very important because if you don't get along you're your colleagues, things do not work out. (Interviewee B-12, Lines 79–83)
We have friendly relationships here. We work together in a comfortable environment and we stick together in the company. Due to the family atmosphere, we have made good friends. (Interviewee B-2, lines 45–48)
System pressure
The relationship with other people can be good or bad depending on what kind of job and responsibilities you have. For example, if you are the person in charge of a key department everyone will ask you for support, and if a problem arise in that department your work pressure will increase and you will have some friction with people who are pushing you. Now imagine that solution does not depend on that person. The more the pressure you have, the less the help to others you can give. (Interview B-9, lines 304–311)
Sometimes I have to manage two different projects simultaneously. When that happens, I must divide my time by half and go back and forth in order to accomplish the objectives of the two projects. In this regard, one of the major problems we face has to do with the supply of materials and the need to coordinate both business units to solve this kind of situations. However, sometimes I have no time and people don't understand it. (Interviewee B-10, lines 41–44)
System support
Sometimes we are working very hard and fast. Suddenly we realize that we get ride of an important raw material. Due to the lack of these materials we have to stop working, and that certainly affects people's motivation and enthusiasm. Without any doubt, this fact in turn affects the quality of relationships between the personal from the two business units. (Interviewee A-6, lines 155–160)
When there is no enough money, they [B1] buy low quality materials that are cheaper. These raw materials cause operational problems here [A1] and things start go wrong. When this occurs, we blame the operators but I feel this is not fair. (Interviewee B-15, lines 419–427)

According to the evidence of this research, the quality of relationship between individuals relies on twelve agent variables and seven context variables. The majority, and probably the most important grounded variables refer to the agent dimension that is related to the willingness of a person to do something for someone else- people behaviors or abilities-. Most of the evidence found points to the agent dimension (see Figure 5).

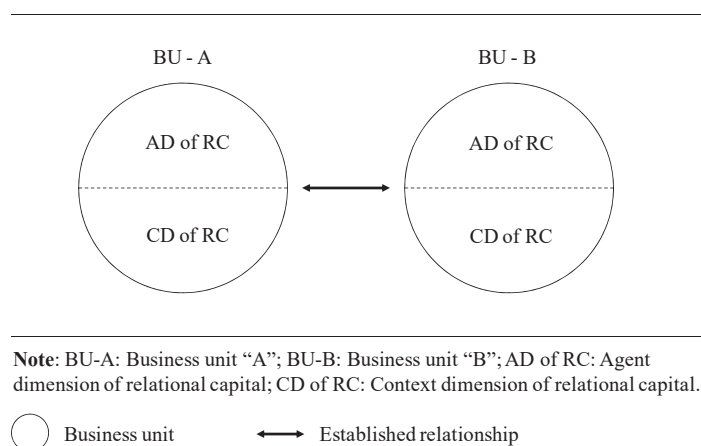


Figure 5. General representation of dimensions.

5. Discussion

This section presents the significance of the research findings by relating them to the relevant literature in terms of both theoretical contributions and empirical findings. In this research, by breaking down RC into a more comprehensive concept, we offer clear evidence of at least three important theoretical contributions: (1) this study develops a two-dimensional, multivariable conception of RC; (2) given those dimensions and variables, this study offers evidence of the definition of dimensions and variables that describe the quality of relationships between individuals from two intrafirm business units, improving our understanding of human interactions in these contexts; (3) although these two dimensions and their variables are analytically separate, in this research, it is recognized that in fact they are highly interrelated.

Even though some theoretical contributions exist on RC (Kale et al., 2000; Sarkar et al., 2001; Castro et al., 2004; Dewhurst & Cegarra, 2004; Dhanaraj et al., 2004; Moran, 2005), from the authors’ perspective, those contributions are significant but incomplete, since they do not identify the dimensions and variables of the RC in an intrafirm context. In this sense, one of the most important purposes of this paper was to find evidence to the existence of a two-dimensional, multivariable RC concept (Rivera & Carrillo, 2016). It is two-dimensional because there are two broad theoretical categories of relational capital: the agent dimension, which involves some personal characteristics, and the context dimension, which involves some characteristics of the context where relationships take place. It is important to mention that although these two dimensions are analytically separate, the researchers recognize that many of the features described are, in fact, highly interrelated.

Despite the importance of social interaction in an organizational context and recognizing that the development of organizational relationships are important factors for a firm’s growth and development (Mu et al., 2008; Tang et al., 2008), little is known about the characteristics that affect the quality of relationships between individuals from intrafirm business units. Generally, it is assumed that the development of good work relationships will positively influence some other aspects of the work. However, this hypothetical idea is meaningless if we do not know what elements must be considered to define the quality of relationships. More specifically, our study confirms the results of previous research that strongly associate the concept of RC with the value of relationships that agents maintain with other agents in their environment (Lagesa et al., 2005; Naudé & Buttle, 2000; Storbacka et al., 1994; Rivera & Carrillo, 2016).

Highlighting the role of RC, the authors believe the results of this research complement the work of other scholars who stressed the role of trust and personal interaction in organizational relationships (Gulati, 1995; Zaheer et al., 1998). The evidence in this research

shows, however, that RC is not only linked to agent variables in general, but also to context variables. This finding complements the work of Rivera and Carrillo (2016) who argued that the quality of relationships that agents maintain with other agents in their environment relies on the context conditions, the object characteristics, and the agent's perception. In this work, no evidence of the object dimension was found. Through internal interactions between intrafirm business units, firms can achieve a better understanding of their activities and processes that, in many cases, are the most important sources of new ideas and information, which can lead to better performance.

According to the findings, this study may not be only based on the RC literature but may also be connected to social science and psychology. In this regard, the view of RC the researchers develop in this research fundamentally supports the idea that some decisions that people make do not follow the *homo economicus* rationality. On the contrary, the evidence of this study suggests that the decision to establish quality relationships is based on emotional and social aspects. These results have interesting implications for the *homo reciprocans* concept proposed by Dohmen et al. (2009), since it supports the idea that reciprocity is one of the most common types of social preference. Moreover, our findings are consistent with authors who suggested that individuals appear to care about fairness, reciprocity, and cooperation (Fehr & Gächter, 1998, 2000; Fehr & Schmidt, 1999; Bolton & Ockenfels, 2000; Dohmen et al., 2009) when they make some important decisions. Hence, this research can also be important to behavioral economics science that includes the analysis of how socialization, networks, and identity shape people's behavior in organizations (Camerer & Malmendier, 2007, in Diamond & Vartiainen, 2007).

Our findings could also be important for the analysis of the family business literature, since our study is based on one such study. In the context of family firms, the role of RC is well documented in the academic literature (Cucculelli et al., 2019; Debicki et al., 2020). RC has been used to analyze family organizational environments where the richness of the familial ties is developed based on foundations of trust (Arregle et al., 2007), as well as a shared vision and purpose and similar norms and values (Pearson et al., 2008). Our findings contribute to the complex understanding of family relationships in the organizational context.

Another theory that has been used in several studies of human behavior is social exchange theory (Blau, 1964). Some authors (Bock & Young-Gul, 2002; Tiwana & Bush, 2005) suggest that social exchange theory is a useful theoretical lens for examining relational behavior because it was developed to explain why individuals engage in cooperative behaviors that are not formally rewarded by an organization. In this regard, consistent with those studies, the results of this research suggest that social factors are important predictors of relational behavior.

This research is also important to the current literature, which is making continuous efforts to determine the quality of relationships within the organizational context, with most of them being developed within the marketing paradigm. From this perspective, authors (Crosby et al., 1990; Lagesa et al., 2005; Naudé & Buttle, 2000; Storbacka et al., 1994; Wilson & Jantrania, 1994) have suggested some variables that can be used to measure the quality of a relationship. This study contributes to identifying 17 variables from the field, distributed in two dimensions, that affect the quality of relationships.

6. Conclusions

The multi-theoretical approach used in this research contributes to the literature because it provides insight into the elements necessary to establish and develop high-quality relationships between individuals from different business units. In this regard, this study's most important contribution is in the realm of theory building, associated with

the RC literature. This study also contributes to several streams of research. First, it adds to the RC literature by identifying its dimensions and variables. In this regard, one of the most important theoretical contributions of this research is the fact that the relational capital dimensions and variables are grounded definitions that emerge from the analysis of qualitative data.

In terms of methodological contributions, it could be said that in this research, participant observation, semi-structured in-depth interviews, and grounded theory were used to gain a better understanding of the quality of relationships between members in two business units, serving as research sites. Through these methodological tools, it became apparent that there are strong behavioral agent variables, as well as contextual ones, that impact the quality of relationships. The use of the collective application of these methodological tools to build a holistic understanding of RC dimensions and variables is a unique contribution of this study. No previous studies were found that applied the same combination of methods to describe and operationalize the RC concept. Therefore, the current study contributes to research practice by suggesting the adoption of a combination of methods with which to collect and analyze data to develop theory. In summary, this study contributed methodologically to current thinking about research practice through developing and testing a package of methods for collecting and analyzing data.

Although the most important implications of this study are in theory building, the results also indicate several practical implications that business units can implement to improve their relational practices. The dimensions and variables proposed in this research might be useful for practitioners interested in growing and learning through the development of RC variables that affect some aspects of intrafirm business units and in organizational context in general. The results of this research can perhaps be viewed as offering “relational key aspects” in understanding relational dynamics between people and functional areas of the organization.

This study can be beneficial for those in charge of the design and application of organizational relational policies; for nonprofit organizations that work to improve RC between significant agents in their organizations and around them; and for people in general who are interested in the improvement of our society through the development and maintenance of mutual gain relationships over time.

The main suggestions for those in charge of creating and maintaining relationships in organizations are to use the findings in this research as (1) a practice tool to help people establish and maintain quality relationships over time in order to improve their working environment; (2) a tool to organize and manage intraorganizational teamwork; (3) and a guide to design training courses to help participants and companies improve their relationships between themselves.

While the study makes important contributions to the RC literature, several limitations should be acknowledged. The first concerns the limited context within which the research was conducted. To obtain a richer view of the RC dimensions and variables, the researchers decided to study the phenomenon in-depth in two intrafirm business units. Therefore, the findings of this research could be related to the nature of these business units’ activities. A second important limitation is the fact that this is a cross-sectional approach to data collection. This precludes the study of the temporal aspects of relationships. This is particularly important because relationships and networks change and evolve over time. Since this research reflects the findings of just a cross-sectional, embedded single-case study, more studies need to be undertaken in the future to confirm/refute the findings.

Furthermore, this research has the limitation of focusing on key actors in business units. It would also be interesting to investigate all participants in the two business units and, thus, enable a comparison between the two “complete” business units to see if there

is any difference. However, every attempt was made to be transparent and to reflect the participants' accounts of the research problem. We also recognize that even though we decided to use RC perspective at the individual level of analysis to understand relationships between people and the dynamics that those relationships imply, some other interpretations and concepts (i.e., social capital) can be used to do so.

This research study points to several potential areas that should be further explored by future work. In this sense, further studies are recommended in the following areas. First, in this research, a multi-method approach was adopted to answer the research question. Different methodologies can be used to generalize the substantive theory into a formal theory. In this regard, it is suggested that the findings in this research can be verified through deductive research in other complementary studies to assess the strength of the empirical support for this theory. Moreover, the substantive theory generated in the study could be expanded and generalized by investigating other business units, or even different companies, in other contexts and geographical regions around the world. The research findings of this study could be used as a theoretical foundation for this type of future work. The development of some longitudinal studies to evaluate changes over time across relationships and networks is also recommended.

Second, future work could explore the causes and consequences of relationships between RC variables and the performance of business units and, thus, gain a deeper understanding of the relational phenomenon inside organizations. It would be interesting to conduct studies to see whether relational capital variables can be a predictor of business unit performance.

Finally, the authors propose that the RC variables do not occur independently, but that these variables are convergent. It would be interesting to investigate how these variables jointly affect other variables in an organizational context.

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Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A. Semi-Structured Interview Guide

Opening.

Introduction: My name is (name of the researcher) and I am doing a research about the concept of relational capital between intra-firm business units.

Objective: The purpose of this interview is to obtain information regarding your ideas about the concept of relationship (the way they are established and developed) as well as the necessary variables and conditions to establish quality relationships between people.

Ethical considerations: This interview will be recorded in a digital audio file and will be stored in a password folder at the researcher computer. It is important to say that the researcher is the only person able to access the computer. In order to ensure the confidentiality as well as the sincerity of your responses, this recording, as well as the notes I will take during the development of the interview will be, at all time, in researcher hands. Neither your name nor the content of your interview will be revealed since the findings of this research will be presented as general, non-personal, observations and conclusions.

Introductory questions.

Could you please tell me, what is your name, position and for how long time have you been working in this business (and business)?

What activities do you develop during your workday?

What are your main duties and responsibilities within the company?

[If the participants do not say anything, ask:]

a. Are you in operational or administrative area?

b. Do you like your job?

c. Why do you like your work?

d. How the work environment is?

Transition questions.

Do you have any relationship with other business unit personnel?

Could you please tell me the name of people from the other business unit you are in touch with?

To develop your daily activities, do you think that the relationships that you establish with your co-workers are important?

Why do you think it is important to establish relationships with colleagues from other business (A1/B1) unit?

Key questions.

Who are the key people in these relationships (issues of work, ideas and initiatives, social support)?

How are the two units of business (A1/B1) linked?

Do you think that there is a collaborative desire between business units?, why?

How would you describe the relationships that you establish with the staff of the other business unit (excellent, very good, good, regular, bad)?

What conditions or elements are necessary to evaluate a relationship as a good or bad? (mutual trust, mutual compromise, exchange of bilateral information, close interaction, prestige, exchange, mutual respect, reciprocity/fairness, friendship, etc.)

How would you evaluate the quality of these relationships with your other co-workers from this and the other business unit?

Do you think that the company encourages you and your classmates to establish relationships out of work activities?

In which cases do you think that the relationships that you establish with other business unit (A1/B1) staff has been affected?, what element would you mention?

What it is necessary to improve the relationships between this and the other business unit staff (A1/B1)?

Within the company, are there meetings involving staff from the two units of business (A1/B1)? How often these meetings are scheduled and how are they developed?

Ending questions.

If you had the opportunity to speak with the director of the company, what advices would you give him to promote relationships between colleagues of the two business units; what advices would you give him to develop or improve the transfer knowledge and information processes?

Through this study, I am trying to understand how people from different business unit, establish relationships between them and how do these people transfer knowledge. Before concluding this interview, is there anything you would like to mention, that it has not been previously addressed?

Thank you very much for you participation in this research

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Article

Technology-Enabled Learning for Green and Sustainable Entrepreneurship Education

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Abstract: (1) Background and objectives: Global crises such as climate change, pandemics, and resource depletion present unprecedented challenges that require coordinated and innovative responses. This study advocates for a bottom-up strategy by proposing and developing tools that empower individuals and organizations to embrace green and sustainable entrepreneurship, fostering localized solutions with global impact. In this context, the research explored the integration of technology-enabled entrepreneurship education (EE) into engineering curricula, with a focus on sustainable and green entrepreneurship. Leveraging insights from European projects, the research developed a cloud-based entrepreneurship educational system featuring three e-learning platforms. Particularly, one e-learning platform was specifically designed to support green and sustainable entrepreneurship education. (2) Methods: the study involved literature reviews, stakeholder surveys, interviews with green entrepreneurs, and iterative platform design. (3) Results: Key outcomes of the research include a methodology for designing pedagogical strategies and learning content for green and sustainable EE. Additionally, digital tools such as the green business innovation canvas, TRIZ-inspired matrices, and AI-driven recommendation systems were created to equip learners with the skills to develop sustainable business models. (4) Originality: The study's novelty lies in its integration of advanced digital tools with original pedagogical strategies, providing a scalable framework for incorporating sustainability into entrepreneurship education. These findings have practical implications for educators and policymakers working to promote eco-friendly business practices. Future research should investigate the scalability of these tools across diverse educational contexts and evaluate their long-term impact on fostering sustainable entrepreneurial mindsets.

Keywords: green and sustainable entrepreneurship education; e-learning; conceptual learning; knowledge graphs; generative AI

1. Introduction

1.1. Background and Objectives of the Study

Since the signing of the Kyoto Protocol and the Paris Agreement on climate change, the challenges associated with the need for sustainable development have become increasingly pressing (Brentnall & Higgins, 2024). This suggests that top-down approaches to addressing global crises are of limited effectiveness unless they are accompanied and supported by bottom-up initiatives driven by economic actors.

The bottom-up initiatives may benefit from the firsthand knowledge of the entrepreneurs and local communities of specific challenges and cultural contexts. Small-scale solutions can be tested, iterated, and improved more rapidly than large-scale policies.

Arguably, widespread education in green and sustainable entrepreneurship may be one of the most effective strategies for implementing a bottom-up approach to tackling these crises.

Entrepreneurial activities are recognized as key drivers of progress in modern society, playing a significant role in economic growth, job creation, technological innovation and in addressing societal needs.

These social trends led to a rising emphasis on delivering entrepreneurship education, (Stoica et al., 2020; Galindo & Méndez, 2014) within educational systems globally. Entrepreneurship education (EE) aims at helping individuals acquire the skills and the mindset necessary to navigate and succeed in economic and business environments, (Rideout & Gray, 2013). Furthermore, EE is believed to enhance learners' creativity and problem-solving capacities, valuable qualities across career paths in today's social and economic backgrounds.

The urgency of climate change and the outbreak of the COVID-19 pandemic shifted the focus of EE towards green and sustainable aspects (UNESCO, 2020).

The pandemic exposed vulnerabilities in the global economic systems, prompting a reevaluation of traditional business models and an increased emphasis on sustainability in business practices (Bogoslo et al., 2022).

Green entrepreneurship, which encompasses eco-friendly and sustainable business practices, emerged as a new direction for socio-economic development. Many entrepreneurs are now focusing on business projects that prioritize environmental sustainability alongside profitability. Although the interest in green entrepreneurship is growing, comprehensive frameworks and digital tools for supporting green and sustainable entrepreneurship education remain scarce.

In this context, the general objective of the present study can be formulated as follows: to develop the methodological framework for creating educational content for green and sustainable entrepreneurship, and to create a scalable digital platform capable to deliver this content to a large number of learners.

To guide the study and frame the interpretation of findings, the following research questions were formulated:

RQ1: How can digital systems and tools support traditional and innovative pedagogies in entrepreneurship education?

This question explores the capabilities and features of digital systems in enhancing EE by supporting both established and novel pedagogical approaches.

RQ2: How can the digital tools and innovative pedagogical approaches—such as conceptual learning developed in this study—contribute to green and sustainable entrepreneurship education?

This question investigates how digital interactive tools pedagogies can be created to better assist students in designing eco-friendly business projects, balancing environmental objectives with profitability, and incorporating best practices in sustainability.

RQ3: How can the digital tools and pedagogical approaches developed in this study foster students' creativity and innovation skills?

This question examines the contributions of digital interactive tools, including TRIZ-like innovation matrices and others, in supporting the development of students' creative and innovative problem-solving skills.

RQ4: How can generative AI enhance the creation of effective digital content for technology-driven learning in green entrepreneurship?

This question examines the role and effectiveness of generative AI in structuring and organizing raw data, facilitating data integration and retrieval, delivering personalized recommendations, and supporting students in understanding complex concepts and developing innovative solutions in green entrepreneurship.

1.2. Research Gap and Novelty

Despite the growing emphasis on entrepreneurship education (EE) as a tool for fostering innovation and economic resilience, its integration into engineering curricula with a focus on green and sustainable practices remains underexplored.

While existing studies highlight the importance of sustainability in business education, they often lack practical frameworks and digital tools to effectively deliver these concepts. Moreover, few studies systematically investigated how cutting-edge technologies can enhance the teaching and learning of sustainable entrepreneurship.

Unlike previous studies that primarily focus on traditional EE methods, (Pittaway & Cope, 2007; Lackéus, 2015), this study introduces novel digital tools and pedagogical approaches tailored to green entrepreneurship. This approach is supported by recent advancements in IT technologies (Edge et al., 2024).

In this sense, the study fills the research gaps by:

- Developing a cloud-based educational system that integrates three e-learning platforms tailored for sustainable entrepreneurship education.
- Providing practical insights through field research, including interviews with entrepreneurs engaged in green practices, and creating a data repository of real-world case studies to support experiential learning.
- Developing a methodology for creating digital content using raw data on green businesses gathered from real-world sources, converted into a structured computational format with the help of advanced IT technologies as generative AI.
- Incorporating innovative learning technologies, including conceptual learning frameworks, to deepen students' understanding of green business principles.
- Exploring the use of AI-driven recommendation systems to provide personalized guidance in designing sustainable business models.

By offering scalable tools and methods, this research provides an original contribution to the fields of entrepreneurship education and sustainability.

2. Brief Review of the State of the Art in Entrepreneurial Education and Technology-Enabled Learning

2.1. Literature Review Insights for Technology-Enabled Entrepreneurship Education

The design and development of our cloud-based digital system for EE has been achieved within the framework of three European projects, ProBM2, (ProBM2, 2021), EntrNET, (EntrNET, 2023), and InnoGreen, (InnoGreen, 2024). These projects aimed to enhance digital learning in the field, with a focus on green and sustainable entrepreneurship in the latest project, InnoGreen.

To support these objectives and deliver effective digital learning tools, foundational studies were conducted during the initial projects' stages. These studies included literature reviews and research to investigate the latest trends in EE. The reviews provided valuable insights, such as identifying tendencies, gaps in current practices, and novel approaches such as AI-driven tools. The review findings influenced the design strategies used in developing digital systems and tools for EE.

The literature review included studies (e.g., Giacomini et al., 2011; Katz, 2003; Lin & Sekiguchi, 2020) and reports (e.g., Kozlinska, 2011) examining the content and outcomes of EE programs across diverse educational settings. The Eurydice report, by the EACEA Agency of the European Commission (EACEA Eurydice, 2016), offered valuable insights into the current state of EE in Europe. These sources provided comprehensive analyses, highlighting both the strengths, the limitations, and areas for improvement in existing EE teaching and learning practices.

The literature review highlighted several limitations in EE, including the absence of a commonly accepted definition, clear expected outcomes, and standardized teaching methods. These remain topics of ongoing debate. Additionally, there is a shortage of specific tools for assessing learning outcomes in EE, and few educational settings incorporate practical entrepreneurial experiences as a regular part of the curriculum.

In technology-enabled EE, the literature highlights various approaches, including virtual lectures, project-based learning, and interactive simulations. These models support the experiential learning essential to entrepreneurship education (Pittaway & Cope, 2007).

Additionally, some study programs and courses incorporate gamification, peer collaboration tools, and online assessments to cultivate real-world skills and entrepreneurial mindsets, (Lackéus, 2015; Neck & Greene, 2011).

Studies on e-learning for EE emphasize the importance of experiential, as well as collaborative, and adaptive learning experiences that accommodate the different learning styles in online instructional activities (Graevenitz et al., 2010).

Recent studies highlight how generative AI can transform entrepreneurship education (Bell & Bell, 2023) and research (Ferrati et al., 2024). Generative AI supports design thinking by proposing ideas for market research, business models, and product design. This encourages students to explore and refine concepts, fostering confidence, interest, and self-efficacy in entrepreneurship education while preparing them for entrepreneurial careers. This fosters greater confidence, interest, and self-efficacy in entrepreneurship education, preparing students to address challenges and pursue entrepreneurial careers (Park & Sung, 2023).

Additionally, AI can benefit start-ups by supporting idea generation and resource optimization, empowering entrepreneurs with limited resources. Its integration into education and practice builds important skills for sustainable business opportunities.

2.2. Background Research in the Educational Context

Over the past decade, our research team participated in several EU-funded international projects aimed at developing educational content to strengthen students' transversal skills, including entrepreneurial skills, across diverse backgrounds. This content was made accessible through dedicated digital platforms. The research revealed that many transversal skills, often overlooked or insufficiently emphasized in formal education, such as creative thinking, the capacity to innovate, the ability to conceptualize information, and the capacity to incorporate contextual information in planning and decision making, are also key traits of successful entrepreneurs (Pecheanu et al., 2020).

These skills, in general, are shared by individuals who can effectively navigate the rapid technological and social changes of the socio-economic environments.

Conversely, entrepreneurial education can foster skills that are valuable not only in business, but across many professions in modern society. The entrepreneurial competencies include, among others, critical thinking, synthesizing ideas from substantial amounts of information, identifying opportunities and making quick decisions, planning, and risk management. These competencies and skills are important for success in both professional and entrepreneurial settings. However, sustaining development of these competencies

through entrepreneurial education programs and courses requires a shift from narrowly focusing on business creation to fostering a comprehensive entrepreneurial mindset.

Taking into consideration all these ideas and approaches, background research was performed to complete the foundations necessary for building an EE-supporting digital environment.

This field research included surveys designed to collect feedback from stakeholders, learners, teachers, entrepreneurs, and employers, in an effort to understand their needs and preferences regarding the EE (Pecheanu et al., 2023).

Research findings show that most learners prefer practical entrepreneurial experience and favor activities involving direct interaction with entrepreneurs, such as mentoring or project collaborations.

From the learners' perspective, an effective EE program should offer content that develops a series of soft skills and transversal competencies, such as communication, creativity, critical thinking, or financial planning and management. In cases where real entrepreneurial experiences are not feasible, students emphasized the idea of having the opportunity to work with simulation environments or virtual business incubators.

Regarding the preferred method for delivering entrepreneurial education content, our students appear somehow resistant to digital technology, likely due to the survey's timing shortly after the COVID-19 pandemic, when online education was heavily utilized and linked to social isolation. Nonetheless, digital technology remains invaluable for broadening access to education.

Overall, the background research highlighted the necessity of using novel instructional methods to deliver EE content more effectively to learners. As a result, the digital content for the cloud-based platform for EE was designed for both traditional and hands-on learning experiences, such as modeling, conceptualizing, designing, planning, and lessons on how to forecast progression or identify trends in business activities.

2.3. Instructional Theories Research for Technology-Enabled Green Entrepreneurship Education

Research on instructional theories can provide a foundation for designing and developing effective technology-enabled learning systems across various domains, including (green) entrepreneurial education. These theories provide principles and approaches that can guide the creation of digital frameworks able to support users in acquiring domain-specific knowledge and skills. By integrating insights from established instructional theories, developers can design systems that effectively address user needs in terms of learning content, user engagement, and pedagogical strategies. Key instructional theories such as continuous learning theory, constructivism, behaviorism, humanistic theory, educational technology theory, and conceptual learning theory offer valuable perspectives on how technology-enabled learning systems can be structured.

Continuous learning theory highlights the need for adaptable, lifelong learning experiences supported by digital systems. To apply this theory in a green entrepreneurship e-learning course, several strategies should be implemented. Experiential learning involves hands-on projects that simulate real-world entrepreneurial activities. Reflective practices, such as self-assessment and group discussions, help students evaluate their learning and environmental impact (McLeod, 2024). An interdisciplinary approach integrates environmental science, business, and technology to provide a comprehensive understanding. Addressing real-world sustainability challenges fosters innovation and practical application of concepts (Ansar et al., 2024).

Aligned with continuous learning theory through ongoing experiential learning, interdisciplinary approaches, and sustainable challenges, the Green EE e-learning platform

facilitates ongoing skill development and knowledge acquisition. It allows learners to engage with content at their own pace and revisit materials as needed.

Constructivism theory emphasizes interactive, learner-centered activities where knowledge is actively constructed through exploration and problem-solving. Its key principles include active learning, social interaction, contextual learning, and building on prior knowledge (Serhat, 2021). In a green entrepreneurship e-learning course, project-based learning can help students address real-world environmental challenges, while collaborative activities encourage teamwork and diverse perspectives (Morselli, 2018). Additionally, real-world problem-solving fosters engagement and the practical application of concepts, promoting innovation in sustainability solutions (T. Li et al., 2024).

Constructivism theory informs the design of interactive and learner-centered tools, such as ontologies, knowledge graphs, and modeling canvases within the Green EE e-learning platform. These tools enable learners to construct their understanding of green entrepreneurship through exploration and reflective problem-solving activities.

Behaviorism emphasizes the significance of reinforcement and feedback mechanisms in facilitating learning progress and maintaining user motivation. On the EE learning platform, behaviorist principles are applied through gamification and mastery learning strategies. These include the use of immediate feedback and rewards to reinforce positive learning behaviors and sustain learner engagement.

The humanistic theory of learning highlights the need to address individual learning preferences, foster self-actualization, and provide meaningful, empathetic educational experiences. This theory emphasizes personal growth, autonomy, and the alignment of learning with sustainability values.

Aligned with humanistic theory, the Green EE digital learning environment fosters independence and ethical responsibility, inspiring students to align their entrepreneurial goals with broader societal and environmental objectives.

Educational technology theory connects pedagogy and technology to enhance learning through various frameworks guiding the design, implementation, and evaluation of educational tools. Key aspects include dialogic theory, which highlights the role of dialogue and interaction in tech-enhanced learning (Wegerif & Major, 2024). Extended theories such as anchored instruction and cognitive flexibility support flexible and context-based learning, (Ouyang & Stanley, 2014). Practical applications involve developing digital curricula and using data analytics to personalize learning experiences, improving engagement and outcomes (Wegerif & Major, 2024).

Educational technology theory underscores the integration of cutting-edge digital tools, such as AI, to enhance accessibility and the effectiveness of green entrepreneurship education. Rooted in educational technology theory, this research leverages advanced tools such as generative AI and knowledge graphs to enhance the delivery of educational content, making complex concepts more accessible and fostering deeper understanding.

By leveraging these theories, technology-enabled learning systems can provide comprehensive support to users, offering tailored content, engaging activities, and effective feedback mechanisms. Together, these theories provide a robust framework for designing effective curricula and teaching methods that meet the needs of diverse learners in the context of sustainable development.

2.4. Conceptual Learning Theory and Entrepreneurship Education

Conceptual learning theory focuses on understanding concepts and their interrelationships, rather than memorizing facts or isolated pieces of information. It encourages learners to grasp overarching principles, patterns, and frameworks, enabling them to apply knowledge flexibly across various contexts. This theory is particularly relevant in education

systems that aim to promote critical thinking and problem-solving skills. This pedagogy, therefore, prepares learners for real-world problem solving, emphasizing adaptive expertise over memorized responses (McLellan, 2005).

The key principles of conceptual learning theory are the following:

- Understanding over memorization: Emphasizes deep comprehension of core concepts instead of rote memorization. Learners focus on the “why” and “how” behind knowledge to build meaningful connections.
- Knowledge organization: Concepts are organized into schemas or frameworks that help learners relate the new information to prior knowledge. Encourages categorization and pattern recognition.
- Transfer of learning: Promotes the ability to apply learned concepts to new situations or problems, enhancing adaptability. Focuses on generalization across contexts rather than context-specific skills.
- Active engagement: Learners actively construct knowledge through questioning, discussion, and exploration. Encourages inquiry-based learning methods.
- Concept mapping: visual tools such as concept maps help illustrate relationships between concepts, aiding comprehension, and retention.
- Contextualized learning: concepts are taught within relevant and meaningful contexts to enhance understanding and applicability.

Research indicates that conceptual learning can lead to higher engagement and a stronger capacity for knowledge transfer across different fields (Novak, 2010).

In (green and sustainable) entrepreneurial education, for instance, by grasping principles such as value creation and market demand, students can creatively apply these ideas to identify new opportunities in their business projects.

With a deeper understanding of entrepreneurial frameworks, students can develop greater flexibility, creativity, and strategic foresight, which are intellectual traits necessary to navigate challenges and drive innovation in business contexts.

2.5. Use of Knowledge Graphs for Conceptual Learning

Knowledge graphs (KGs) are structured representations of knowledge that organize concepts and their relationships in a directed graph format, facilitating data integration and retrieval (Paulheim, 2017). They consist of networks of nodes, representing entities (referred to as knowledge points), and edges that denote the relationships between these entities, forming interconnected networks.

KGs typically rely on a formal schema or ontology to define entities and relationships in a real-world context. They can be considered practical implementations of ontologies—formal frameworks or abstract models that define the classes (concepts or categories), the relationships between these concepts, and the specific constraints characterizing a particular domain or area of interest.

While ontologies provide an abstract and foundational description of a domain, KGs encapsulate descriptive or factual information about the real world. They focus on representing actual data and relationships within a domain, making information computationally retrievable and useful for queries and reasoning.

KGs can be formally and computationally expressed using various technologies, including GraphML, a graph exchange language format designed for transferring data between graph visualization tools and other applications (Brandes et al., 2014); the Resource Description Framework Schema (RDFS), a Semantic Web technology for data modeling (W3C, 2014); and the Web Ontology Language (OWL), a Semantic Web modeling and query language (W3C, 2004, 2013).

Among these technologies, special emphasis should be given to the widely used RDF standard for knowledge graph representation (W3C, 2014). In RDF, knowledge is expressed in the form of “triples” (subject–predicate–object), where the subject and object represent entities connected by a predicate that defines their relationship. In this case, each triple conveys a specific fact, illustrating the interrelation between two entities.

KGs are foundational to AI applications, such as semantic search, and recommendation systems. KGs can reinforce knowledge management in AI-driven system, supplying models that are supporting retrieval augmented generation (RAG) to deliver more accurate and reliable solutions in the framework of generative AI systems.

In recent years, KGs emerged as powerful tools in creating digital educational content, as they enable the organization and representation of unstructured information in meaningful, interconnected structures. KGs allow educators to develop content that reflects the natural understanding of subjects by interdependencies between concepts, promoting guiding learning through connected topics. Educational content based on KGs and their abstract representation as ontologies fosters conceptual learning by helping students make connections across various areas in field, and to extract the general principles from particular facts about individual instances of classes of objects.

KGs can illustrate links between principles, enabling students to explore connections and relationships.

KG mapping can enhance critical thinking, as students see how discrete concepts fit into larger frameworks, thus supporting knowledge retention, transfer, and generalization. KGs can provide structures for any educational content, supporting holistic understanding and learning experiences that reflect real-world knowledge interrelation, (Abu-Salih & Alotaibi, 2024; Z. Li et al., 2023).

2.6. Generative AI Chatbots and GraphRAG

In recent years, the development of large language models (LLMs) provoked a revolution in the AI field, transforming human–computer interaction with their remarkable ability to “understand” and generate human-like language (OpenAI, 2024).

Trained on vast datasets, LLMs have been integrated into “generative AI chatbots”, impacting activities in many socio-economic sectors, including education (Ghimire et al., 2024).

Despite their outstanding capabilities in language “comprehension” and text generation, LLM-based chatbots have limitations. These include gaps in domain-specific knowledge, outdated information, and proprietary data, all of which fall outside their pre-training data. To address these shortcomings, LLMs can be enhanced through retrieval-augmented generation (RAG) frameworks (Hu & Lu, 2024; Gao et al., 2024).

RAG frameworks improve the quality and relevance of LLM-generated text by incorporating a retrieval mechanism into the generation process, without requiring retraining.

These frameworks query explicitly specified data sources to incorporate factual or conceptual knowledge into the LLM’s context, resulting in responses with greater accuracy and specificity. This method gained attention for its performance and adaptability, particularly in generative AI applications requiring field-specific information.

However, traditional RAG systems face challenges in real-world scenarios, such as their inability to capture structured relational knowledge, a limitation referred to as “Neglecting Relationships”. GraphRAG addresses these challenges by using pre-constructed graph-based data structures to retrieve relational knowledge (Edge et al., 2024), enabling LLMs to generate more precise and contextually relevant responses. Additionally, graph data, such as knowledge graphs, provide summarized representations of textual information, significantly reducing the input length required for generative AI chatbots.

While LLMs excel at processing pure text, they often struggle with data containing structural relationships, such as graphs. GraphRAG frameworks overcome this limitation by retrieving relevant elements from external graph-structured sources or databases.

These pipelines may also include a preprocessing stage, where structured information is extracted and refined from text corpora or other formats, ensuring efficient and accurate integration of graph-based data.

3. Methods

3.1. Development of Learning Content for Green Entrepreneurship Education

The content of the e-learning platform for sustainable and innovative entrepreneurial education for engineering students was developed using a four-step methodology:

1. Conducting research to identify various aspects of business practices related to green and sustainable entrepreneurship and exploring opportunities to incorporate these findings into EE experiences through digital learning.
2. Creating digital learning content on green, sustainable, and innovative entrepreneurship and choosing suitable methods to deliver this content to students.
3. Identifying the educational settings to deliver the new courses for green and sustainable entrepreneurship education.
4. Collecting user feedback after a pilot test, and improving the GSB platform's features based on the evaluations from learners and educators.

To date, the first three of the above steps have been successfully completed. Specifically, the first step had five main phases:

1. Literature review: A literature review was conducted to gain insights into technology-enabled entrepreneurship education (EE), the impact of instructional theories for green EE, and the educational context, as outlined in Section 2. Additionally, a review of literature on green and sustainable entrepreneurship, including scholarly articles (Hockerts, 2017; Linnenluecke & Griffiths, 2010; Zhang et al., 2020) and recent online reports (Eurostat, 2023; EC, 2019, 2022) was undertaken.
2. Field research: Field research was conducted through semi-structured interviews with key stakeholders, including entrepreneurs and industry experts. This research aimed to examine and gather information on eco-friendly practices and strategies adopted by businesses in various European countries.
3. Methodology development: a methodology was developed to create learning content from the raw data on green business practices gathered through field research.
4. Creation of digital content: based on the methodology developed in the previous phase, the raw data collected during the field research were converted into a structured digital format using advanced IT technologies, including generative AI.
5. Refining the educational content created in the previous phases according to the feedback received from users in order to ensure that the intended knowledge is effectively acquired upon completing the training.

3.2. Research Methodology for Creating Digital Learning Content

The process of creating digital learning content for green entrepreneurship education combined field research and generative AI with retrieval-augmented generation (RAG) technology and validation by human experts.

The methodology consisted of four main phases:

1. Data collection through field research.
2. Data analysis for creating a repository of case studies on green and sustainable business solutions.

3. Data conversion into digital content for conceptual learning purposes.
4. Data categorization for knowledge graphs creation.

3.2.1. Data Collection Through Field Research

The field research in this study employed a qualitative approach. Data collection was based on semi-structured interviews conducted either face-to-face or through videoconferencing. Sixty-four interviews were conducted with entrepreneurs from seven European countries: Austria, Romania, Italy, Portugal, Greece, Malta, Poland, and Switzerland.

Participants were selected using specific criteria to ensure a diverse and representative sample. All the participants were properly informed about the objectives of the project, and data confidentiality was guaranteed.

This group included companies and entrepreneurs from various industries, such as renewable energy, waste management, and sustainable agriculture. The focus was on micro-enterprises and small- to medium-sized enterprises (SMEs) recognized for their innovative and impactful sustainability practices (see Table 1).

Table 1. Participants at the interviews in SMES by categories and subcategories.

Category	Subcategory	Number of Respondents
Gender	Male	42
	Female	22
	Prefer not to indicate	0
Age	Below 25 years	2
	25–39 years	28
	40–59 years	31
	60 years and above	3
Current position in company	President/owner	35
	Managing director	10
	Department manager	14
	Team manager	5
Size of the company (Staff headcount)	1–9	22
	10–50	26
	50–250	16
Company's business field	R&D	4
	Production	34
	Services	16

The enterprises were chosen based on their engagement in green practices, forming an appropriate sample for the research objectives. The interviews covered questions aimed at gathering examples of green practices across the nine key areas of a business model: key partners, key activities, key resources, value proposition, customer relationships, distribution channels, customer segments, costs, and revenue streams.

Each area was analyzed through the lens of three dimensions—environmental, social, and financial—resulting in a total of twenty-seven categories for mapping examples of green business practices. Additional questions were included in the survey, such as: “What motivated the implementation of eco-friendly business practices in the company?”, “What obstacles were encountered during the green business practices implementation?”, “What was the positive impact of implementing eco-friendly business practices?”, or “To what extent were the measures worthwhile, including financial benefits?”

The translation of the sixty-four interviews into English produced a large volume of textual data, making it evident that computer-aided data processing is necessary.

3.2.2. Data Analysis for Creating a Repository of Case Studies on Green and Sustainable Business Solutions

The data collected from the interviews were organized into a pool of empirical information for each interview. A generative AI system was then used to summarize these data, converting the raw input into concise outputs.

The summarization process resulted in sixty-four summaries, each focusing on a company-specific sustainability practice. These summaries were subsequently reviewed and validated by a team of experts. The experts enhanced the summaries with comments and additional information to ensure accuracy and completeness.

As a result, sixty-four case studies were created and stored in the repository of business solutions for green entrepreneurship, an expandable resource designed for learning purposes. This repository provides learners with real-life examples of business solutions that support sustainability and eco-friendliness.

This approach combined field research, advanced AI technology, and expert validation to produce the digital learning content. The resulting repository can serve as an inspiring tool for learners, offering practical insights into implementing green practices in business settings.

3.2.3. Data Conversion into Digital Content for Conceptual Learning

The data conversion phase was further divided into four stages:

- Information extraction,
- data validation, and
- data organization.

Information extraction: Generative AI and related tools within a retrieval-augmented generation (RAG) framework were used to extract relevant information from the large volume of text collected during field research. RAG is a technique in natural language processing that enhances a generative AI system's ability to produce quality informative responses by retrieving relevant documents or passages from an external corpus and incorporating them as context during text generation.

Using these advanced tools, the textual data collected from the research were divided into smaller, manageable units during a "chunking" phase. These chunks were then stored in a vector database during the "embedding" phase, which was subsequently linked to a generative AI system. Once the vector database was attached to the AI system, the process of extracting sustainability "triggers" began. This was achieved by querying the AI system using prompts. Importantly, the system was configured to generate responses exclusively from the vector database containing information collected from the interviewed companies, rather than relying on its pre-trained parameters.

The queries resulted in the identification of 159 sustainability triggers—specific attributes characterizing environmental and sustainable practices in businesses. These triggers served as the foundational information for developing conceptual learning tools.

Data validation: The validation of the 159 triggers extracted through generative AI and the RAG framework was performed manually by experts involved in the project. Once validated, human experts refined the detailed descriptions of the green practices associated with each trigger to ensure clarity and effectiveness. Using generative AI with the RAG method, trigger names and descriptions were condensed into concise formats, capturing the essence of each green practice.

These condensed names and descriptions underwent additional validation by human experts to ensure accuracy. The approach facilitated visual representations of the triggers and enabled computational representations of the related information, allowing for both quick reference and in-depth exploration via digital tools such as search or query systems.

Data organization: Each trigger in the final list was assigned a short name and two descriptions: one short and one detailed. The triggers were then stored in a non-relational database and assigned unique identification numbers for referencing. This methodological approach ensured that the extracted and validated information was structured, accessible, and ready to support the development of digital tools for conceptual learning in green entrepreneurial education.

3.2.4. Data Categorization for Ontologies and Knowledge Graphs Creation

To further enhance usability, the validated triggers were organized with the help of generative AI and a RAG framework into three primary categories based on the initial focus of the interviews: environmental, social, and economic.

With aid of generative AI through RAG, these three main categories were further divided into sub-categories based on the specific focus of each trigger.

Finally, each trigger was associated with one or more of the nine business model canvas (BMC) building blocks (see Tables 2 and 3, and Figure 1).

The complex, multidirectional relationships between triggers—grouped into categories and subcategories—and BMC blocks, which were further divided into sub-blocks, were computationally represented using knowledge graphs. These graphs were encoded in GraphML, a graph exchange format (Brandes et al., 2014), and the web ontology language (OWL) (W3C, 2004).

Through these computational representations, conceptual classes and their interrelations were formally defined, creating an ontology of the business model's triggers for green and sustainable entrepreneurship.

Table 2. Environmental triggers linked to the customer segments and value proposition blocks of a business model.

Business Model Canvas Block	Environmental Triggers
Customer segments (responsible customers)	148. Eco-friendly customer engagement practices 149. Partner eco-conscious firms 150. Partner eco-conscious NGOs 151. Sustainable institutions
Value proposition	56. Sustainable products and services 57. Reduce environmental impact 58. Local material sourcing 59. Lower transportation costs 60. Use sustainable materials 61. Sustainable food production 62. Minimize packaging waste 63. Closed-loop waste reduction 64. Green products 65. Renewable energy

This effort enabled the further development of an educational ontology and a corresponding knowledge graph. The green business triggers ontology aims to capture key entities and interactions within the context of sustainable business practices for educational purposes. It includes trigger classes and subclasses, BMC blocks and sub-blocks, as well as their properties and relationships. These computational representations were created to support the development of a generative AI system that will serve as a recommendation tool for students, and the development of the digital tools enhancing the conceptual learning.

Table 3. Environmental triggers linked to the BMC's blocks channels and customer relationships.

Business Model Canvas Block	Environmental Triggers
Channels (responsible customers)	107. Online self-service 108. Local material suppliers 109. Sustainable supply chains 110. Waste management logistics 111. Eco-friendly transportation 112. E-commerce websites 113. Digital communication channels 114. Focus on local suppliers 115. Local distribution channels
Customer relationships	83. Sustainable products and services 84. Reduce environmental impact 85. Local material sourcing 86. Lower transportation costs 87. Use sustainable materials 88. Sustainable food production 89. Minimize packaging waste 90. Zero waste delivery 91. Sustainable logistic processing 92. Eco-friendly delivery

 KEY PARTNERS	 KEY ACTIVITIES	 VALUE PROPOSITIONS	 CUSTOMER RELATIONSHIPS	 CUSTOMER SEGMENTS
1 2 3 4 5 6 7 8 9	15 16 17 18 19	56 57 58 59 60 61 62 63 64 65	83 84 85 86 87 88 89 90 91 92	148 149 150 151
10 11 12	20 21	66 67 68 69 70 71	93 94 95 96 97 98 100	152 153 154 155
13 14	22 23 24 25 26	72 73 74 75 76 77 78 79 80 81 82	101 102 103 104 105 106	156 157 158 159
	 KEY RESOURCES		 CHANNELS	
	27 28 29 30 31 32 33 34 35 36 37		107 108 109 110 111 112 113 114 115	
	38 39		116 117 118 119 120 121 122 123 124	
	40 41 42 43		125 126 127 128 129 130	
 COST STRUCTURE		 REVENUE STREAMS		
44 45 46 47 48 49 50		131 132 133 134 135		
51 52 53		136 137 138 139 140 141		
		142 143 144 145 146 147		

Figure 1. Distribution of the environmental, social, and financial triggers (highlighted with green, light-brown, and light blue), derived from the field research data within the traditional building blocks of a business modeling canvas (BMC). The triggers highlighted in red belong to more than one primary group (environmental, social, and financial).

4. Results

4.1. A Cloud System for Entrepreneurship Education

The cloud system for EE (see Figure 2) includes three digital platforms aimed at fostering skills and practical competencies in business creation and progression:

- The business modeling (BM) e-learning platform, which teaches entrepreneurship through business modeling and financial evaluation of entrepreneurial projects,
- the business innovation and networking (BIN) e-learning platform, which offers interactive lessons on several types of entrepreneurship and supports professional networking in this field, and
- the green and sustainable business (GSB) e-learning platform, which focuses on learning, planning, and modeling of green and sustainable businesses.

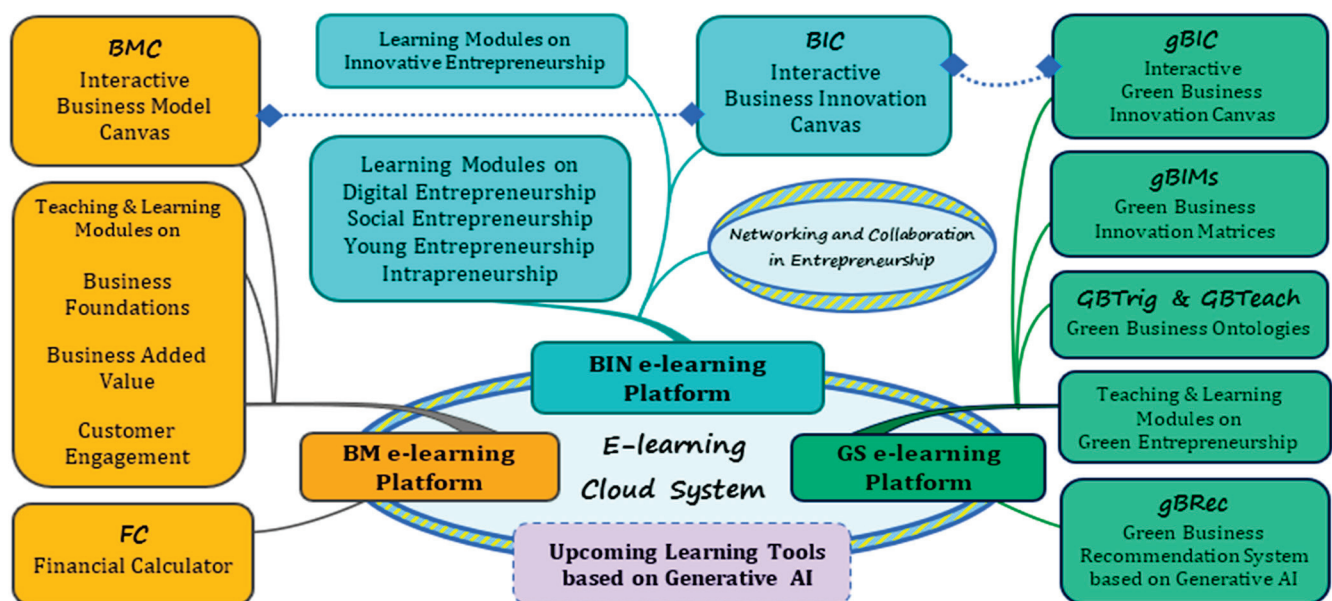


Figure 2. Structure and components of the cloud-based system for entrepreneurship education (CSEE) encompassing three e-learning platforms, each with distinct content and features.

The BM digital environment was the first to be integrated into the EE e-learning system to create the framework of ProBM2 project.

The BM platform provides educational content, focused on the concept of business modeling, as a key element in succeeding with any new business undertaking. It provides digital tools to assist learners in organizing and presenting their business ideas interactively using the business model canvas—BMC, (Osterwalder & Pigneur, 2010). The BMC is a structured framework that describes the key elements of a business. It comprises nine interconnected components (blocks) that outline the main aspects of a business:

- Key partners: identifies collaborating partners, stakeholders, or organizations and outlines their motivations for participating in the business venture.
- Key activities and key resources: specifies the core activities (e.g., production, commerce, and problem solving) and the necessary resources (e.g., physical, intellectual, and financial) to conduct these activities.
- Value proposition and customer segments: represents the value the business aims to deliver (e.g., innovation, cost reduction) and identifies the target beneficiaries.
- Customer relationships and channels: describes the nature of interactions with beneficiaries (e.g., personal assistance, community, and co-creation) and the means (e.g., distribution, communication) through which the value created will be delivered.

- Cost structure and revenue streams: details the major costs involved in the business and the methods of generating income.

The BMC enables users to critically analyze their business ideas, fostering reflection, exploration, and strategic thinking.

The BMC can also serve as a practical organizational tool for developing projects in various fields, including educational initiatives funded by official organization NGOs or private entities. For instance, the educational project, which focuses on creating learning materials and methodologies to teach green and sustainable entrepreneurship, was structured using the interactive BMC tool on the BM platform.

This approach helped establish a general model or conceptual schema for this type of modeling activity (see Figure 3).

 Key Partners <i>Who are?</i>	 Key Activities <i>What are?</i>	 Value Proposition <i>Is consisting of?</i>	 Customer Relationships <i>What are?</i>	 Customer Segments <i>What are?</i>
Partners with proven records from previous projects, displaying reliability. Expert teachers in entrepreneurship education and field research. Institutional stakeholders from national and EU funding agencies. Representatives from companies adhering to sustainable and eco-friendly business practices. Key figures from environmental organizations and green technology companies.	Conducting research into green business methods and practices. Creating learning materials on green business. Developing learning content based on data gathered through field research. Establishing and maintaining an e-learning platform. Promoting the project and its results with a broader audience.	Open access educational resources: digital content and interactive tools for green and sustainable entrepreneurship education. Field-research based content: learning materials derived from real-life data and emphasizing practical solution for eco-friendly entrepreneurship. Novel pedagogy: utilizing digital tools based on generative AI and providing support for conceptual learning. Educating future entrepreneurs: contributing to the education of a new generation of entrepreneurs who prioritize sustainability alongside profitability.	Engaging with the target audience through online educational activities. Facilitating collaboration through online workshops and networking events. Providing support and follow-up services through online e-learning platforms. Offering mentorships opportunities paths for collaboration.	Students and educators: engaging students and educators interested in sustainable entrepreneurship. Aspiring entrepreneurs: supporting aspiring entrepreneurs looking to start eco-friendly businesses. Existing business owners: assisting business owners seeking to transition to sustainable practices.
		 Key Resources <i>What are?</i>	 Channels <i>What are?</i>	
		A curriculum focused on sustainable entrepreneurship. An IT platform for hosting and delivering digital educational content. Financial support and engaging experts in entrepreneurship education.	Providing access to e-learning activities and courses. Hosting workshops that involve individuals and institutions in the learning process. Leveraging social media, newsletters, and presenting project findings and results through scientific journals & conferences.	Environmental NGOs: collaborating with environmental organizations promoting green initiatives in entrepreneurship.
 Cost Structure <i>What is?</i> Main costs include salaries for project's team members, technology infrastructure, content development and administrative expenses. Additional costs will arise from transnational meetings and event organization.			 Revenue Streams <i>What are?</i> Grants from EU or bodies, sponsorship from private companies promoting sustainability. The project may also generate income from workshops and certifications.	

Figure 3. The business model canvas—a graphic synthesis of the conceptual framework for describing a business model.

To improve knowledge delivery through learning experiences, the BM platform organizes the traditional EE content in a format that supports digital micro-learning and mastery learning (Buchem & Hamelmann, 2010; Omer, 2020).

Digital micro-learning breaks educational material into small units, while mastery learning involves brief assessments before and after each unit or lesson. The assessments are incorporated into the learning process, helping learners track their progress.

Together, these approaches reduce time and costs by addressing users' specific learning needs and goals. Micro-learning also gives students greater control of their learning activities, enabling them to choose when and where to engage in training.

The BIN system, the second e-learning platform that has been integrated within the e-learning cloud-system, offers educational content on diverse topics related to the entrepreneurial ventures, such as young, cooperative, and digital entrepreneurship. It offers interactive lessons on business innovation and features a tool to help users incorporate creative changes into their business projects.

Additionally, the BIN platform offers digital tools for professional networking, fostering dialogue and collaboration among educators, students, and business professionals.

The BM and BIN e-learning platforms completed their pilot testing phase, targeting engineering students and adults in continuing education. The pilot testing demonstrated that both platforms are effective and well-received by users.

Many insights were provided for further improvements in terms of new features (use of generative AI and gamification) which can be later incorporated.

GSB—green and sustainable businesses, the third e-learning platform included into the cloud system was meant to support green and sustainable EE through business innovation. It has been developed in the framework of the InnoGreen European project.

The GSB e-learning platform provides educational content and interactive digital tools to help users understand environmental and sustainability aspects, encouraging creativity in their own business projects.

4.2. *The Green Business Innovation Canvas*

Building on this research, our research team developed the green business innovation canvas (GBIC), a digital framework now integrated into the GSB e-learning platform as an interactive design tool (see Figure 4).

The GBIC enables users to design business projects that prioritize eco-friendliness, focusing on reducing environmental impact, managing resources and energy efficiently, and fostering entrepreneurial creativity.

Once users designed their green business projects, they can assess profitability using the BM platform's online financial calculator.

Integrating the GBIC framework with this tool allows students to turn their entrepreneurial ideas into cost-effective green business models, balancing environmental goals with profitability.

As an inspirational framework, the GBIC provides a view of how to develop business models that incorporate green features and sustainable processes.

It can also provide a straightforward approach for entrepreneurs seeking to include in their business's operations a focus on environmental responsibility.

An additional advantage of GBIC is that it enables the harmonious coexistence of economic and environmental goals. For instance, practices such as resource recycling support the circular economy—a model that aligns with the values of younger generations in business development. As a result, the triggers identified through our research, along with the accompanying digital tools, offer young entrepreneurs a practical guidance for adopting eco-friendly practices in their ventures.

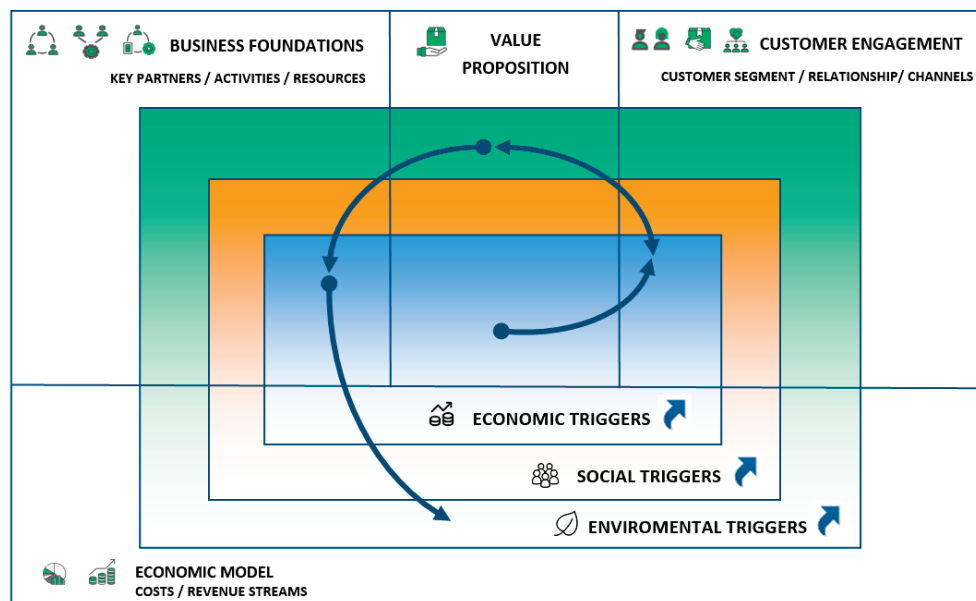


Figure 4. The green business innovation canvas (GBIC) provides a framework to inspire creativity in enhancing the green and sustainable aspects of a business project or enterprise. It defines three primary areas of action by grouping the nine blocks of the business model canvas based on their role within this model. The curved line symbolizes the interdependence among the business aspects within the model's blocks.

4.3. Ontologies for Learning and Teaching Green and Sustainable Entrepreneurship

The examination and in-depth analysis of case studies and trigger content generated through research led to the development of a hierarchical organization of triggers, grouping them into categories (groups) and subcategories (subgroups), as shown in Section 3.2.

The three primary trigger groups were divided into subcategories (subgroups) based on their characteristics, target goals, and potential impacts.

The 70 environmental triggers were classified into eight subgroups, such as Resource Efficiency and Waste Management, Renewable Energy and Emission Reduction, Water and Resource Conservation, Eco-Friendly Products and Services, Innovation and Technology for Sustainability, Sustainable Logistics and Transportation, and the last subgroup, Education, Corporate Social Responsibility, and Community Engagement.

Similarly, the 43 social triggers were classified into five subgroups: Community Engagement and Development, Education and Awareness, Sustainable Operations and Processes, Ethical and Social Responsibility, and Environmental Programs and Standards, and the 46 Financial Triggers were divided into six subgroups (see Table 4).

A review of literature on business models (Freudenreich et al., 2019; Naggar, 2015; Teece, 2018), revealed that each of the nine blocks in the business model canvas (BMC) can be divided into smaller sections or “sub-blocks” based on specific criteria that define the processes or entities within those blocks. These sub-blocks emphasize key aspects of the activities or characteristics associated with each BMC block.

Following this review, the relationships between the features and activities of the BMC sub-blocks and the triggers were analyzed, highlighting the role that triggers can play in sustainable business practices relevant to those sections. Consequently, triggers from the three primary categories were assigned to these sub-blocks based on their characteristics (see Table 5).

Table 4. Subgroups identified within the three primary trigger categories: environmental, social, and financial.

Primary Trigger Groups	Subgroups in Primary Trigger Groups	Triggers in Subgroup
Environmental triggers	Sustainable Partnerships and Collaboration	1, 2, 3, 4, 5, 6, 7, 8, 149, 150, 151, 114, 108
	Resource Efficiency and Waste Management	28, 29, 35, 36, 46, 63, 62, 88, 90, 135, 91, 110
	Renewable Energy and Emission Reduction	30, 31, 47, 50, 32, 57, 65, 49, 134
	Eco-Friendly Products and Services	56, 64, 132, 61, 133, 148
	Innovation and Technology for Sustainability	27, 9, 34, 84, 107, 113, 112
	Water and Resource Conservation	37, 48, 44, 58, 45, 59
	Sustainable Logistics and Transportation	83, 92, 91, 111, 115
	Education, Corporate Social Responsibility, and Community Engagement	19, 131, 87, 148
Social triggers	Community Engagement and Development	66, 138, 117, 118, 119, 96, 97, 98, 139, 155
	Education and Awareness	152, 116, 93, 121, 68, 120, 141, 140
	Sustainable Operations and Processes	100, 52, 136, 137, 38, 153, 70, 51
	Ethical and Social Responsibility	124, 154, 69, 21, 71, 122, 123, 12
	Environmental Programs and Standards	67, 94, 20, 95, 99, 10, 53, 39
Financial triggers	Financial Sustainability and Green Finance	13, 14, 23, 24, 26, 42, 43, 55, 146, 147, 159
	Technology and Innovation	54, 72, 74, 75, 79, 82, 101, 105, 106, 142, 143
	Customer and Market Engagement	125, 126, 130, 156, 157, 158
	Operations and Logistics	102, 103, 128, 129, 145
	E-Commerce and Digitalization	76, 81, 104, 127, 144
	Resource Management and Green Practices	22, 25, 40, 41, 73, 77, 78, 80

Table 5. Financial triggers within BMC blocks' sections.

BMC Block	BMC Block-Section	Financial Triggers Within the Block-Sections
Customer segments	Primary customer segment	157. Customer market expansion
	Niche segments	156. Service/products packages
Value proposition	Product/service features	72. Innovative technologies 79. Eco-friendly practices 82. Sustainable technology solutions 102. Eco-friendly delivery vehicles
	Problem solved	77. Assess operations sustainability 78. Customize/assess sustainability
	Customer gains	146. Green practices funds 147. Sustainable revenue generation
	Unique selling proposition	158. Transparency

This process supported the development of learning materials and tools for the e-learning platform, modeled in a simplified form on the TRIZ (TRIZ Innovation Center, 2024) contradiction framework, so far referred to as “search for innovation matrices”.

This work enabled us to further develop an ontology for learning purposes named green business triggers ontology (GBTrig-O) and a corresponding knowledge graph named GBTrig-KG, green business triggers knowledge graph.

The green business triggers' ontology is trying to capture, for educational purposes, key entities, and interactions in the context of green business practices. It includes the classes and the subclasses of triggers, the blocks and sub-blocks of the BMC, their properties, and relationships.

The green business triggers ontology (GBTrig-O) is designed to integrate general, conceptual knowledge about the elements that shape the development of green business

models. Specifically, it formalizes knowledge regarding triggers for green and sustainable practices, the components of the business model canvas (BMC), and their interconnections.

This knowledge is structured into an abstract framework comprising classes of concepts and their inter-relationships, as in the following formal definition:

$$\text{GBTrig-O} = \langle T, TP, TPS, BMC, BMC-B, BMC-BS, R \rangle,$$

where

T is the trigger class and TPs are its primary subclasses: environmental, social, and financial triggers.

TPS refers to the subclasses for each of the primary trigger categories.

BMC is the business model canvas class, with the BMC-B subclasses corresponding to the nine blocks of the business model canvas.

BMC-BS refers to subclasses for each of the nine BMC blocks.

R represents the relationship between the classes of concepts and their subclasses.

The GBTrig knowledge graph (GBTrig-KG) is built upon the GBTrig-O ontology and integrates factual knowledge, including triggers, business model canvas components, their descriptions, instances, and relationships.

The formal definition of the GBTrig-KG is as follows:

$$\text{GBTrig-KG} = \langle \text{GBTrig-O}, I, A, P \rangle,$$

where:

GBTrig-O represents the classes and class-subclass relationships within the ontology.

I refers to instances of concepts or entities within the ontological classes.

A denotes the attributes of entities, including relationships labeled as DescriptionOf, which connect entities/instances to specific values or properties.

P represents the properties of entities, expressed as textual or numerical values.

The visual representation of the GBTrig-KG, referred to as the KG schema (shown in Figure 5), is a directed graph defined as follows:

$$G = (V, E, \{xv\} \forall v \in V, \{xe\} \forall e \in E),$$

where

V is the set of nodes representing entities (knowledge points).

$E \subseteq V \times V$ is the set of edges representing relationships.

$\{xv\} \forall v \in V$ and $\{xe\} \forall e \in E$ represent the sets of textual attributes (e.g., labels or names) associated with nodes and edges.

The purpose of GBTrig-KG is to provide students with a comprehensive, holistic background for searching, associating, and applying information to foster innovation in developing their green, eco-friendly business projects.

Additionally, a second ontology, named GBTeach-O, was designed for teaching purposes. GBTeach-O incorporates concepts and relationships related to topics, subjects, concepts, and their inner relationships, as well as pedagogies and instructional strategies employed in the newly created course on green and sustainable entrepreneurship.

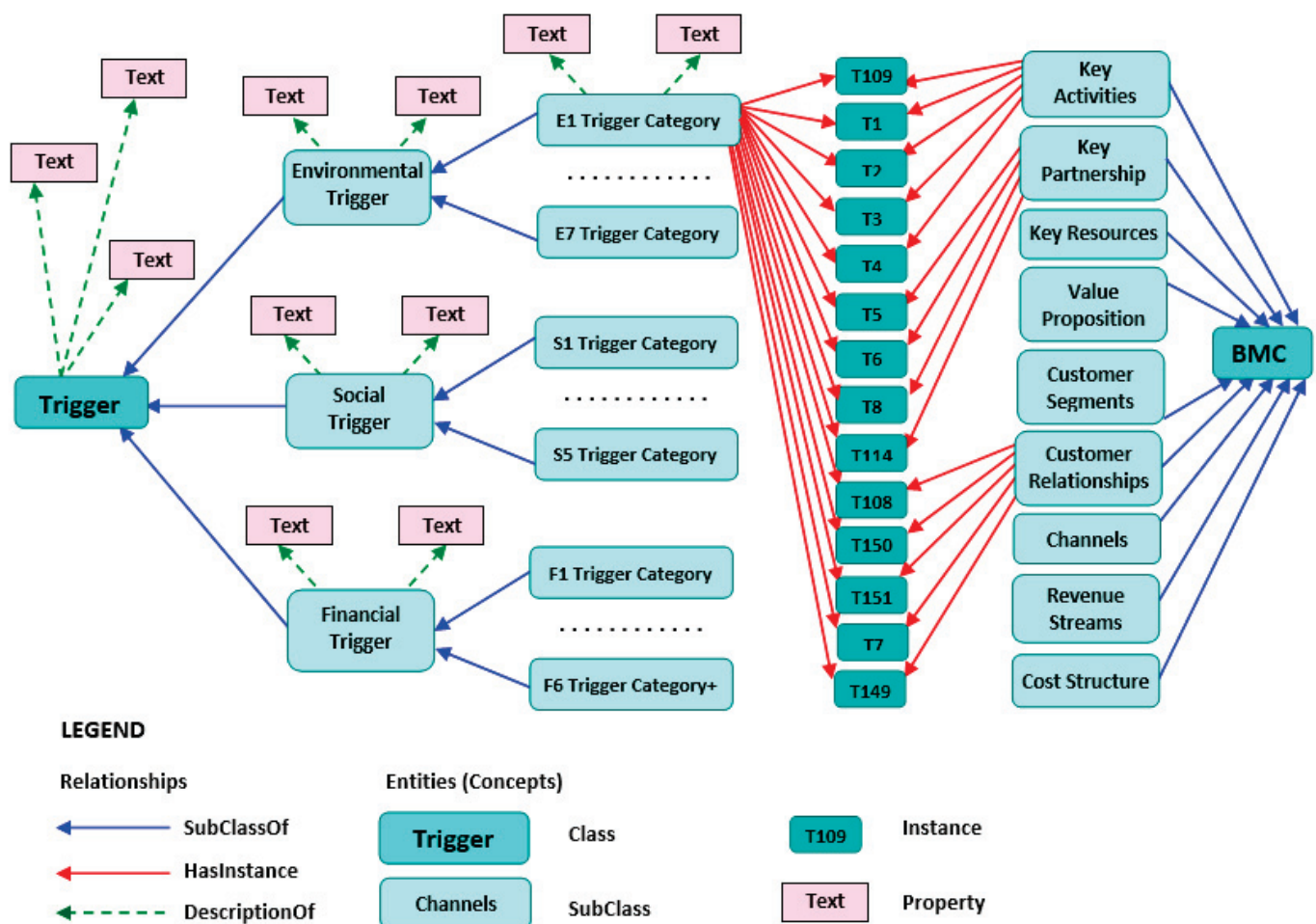


Figure 5. Simplified representation of the GBTrig-KG (green business triggers) knowledge graph design schema. Entities are depicted as classes and subclasses, consistent with RDF/OWL serialization. The “Trigger” class and its three direct subclasses—“Environmental Trigger”, “Social Trigger, and Financial Trigger”—are represented.

Both ontologies, GBTrig-O and GBTeach-O, and their corresponding knowledge graphs serve complementary roles: the GBTrig ontology and knowledge graph focuses on the structural and functional aspects of green business modeling, while the GBTeach ontology and knowledge graph supports the pedagogical framework for delivering synthesized, relevant educational content. In this way, these ontologies and their knowledge graphs provide a foundation for integrating green and sustainable entrepreneurship into conceptual learning and teaching contexts.

The newly created ontologies, written in the OWL language, were submitted as input data to Protégé, an open-source ontology editor and visualizer designed for creating semantic knowledge structures, (Debellis, 2021; Stanford Center for Biomedical Informatics Research, 2020). The Protégé information system facilitates knowledge management, allowing users to investigate the relationships between concepts, instances, and their classes within an area of interest. It supports user queries through SPARQL, a query language for retrieving data from knowledge structures, and offers intuitive visualizations of ontological classes, sub-classes, instances, and their connections (see Figure 6).

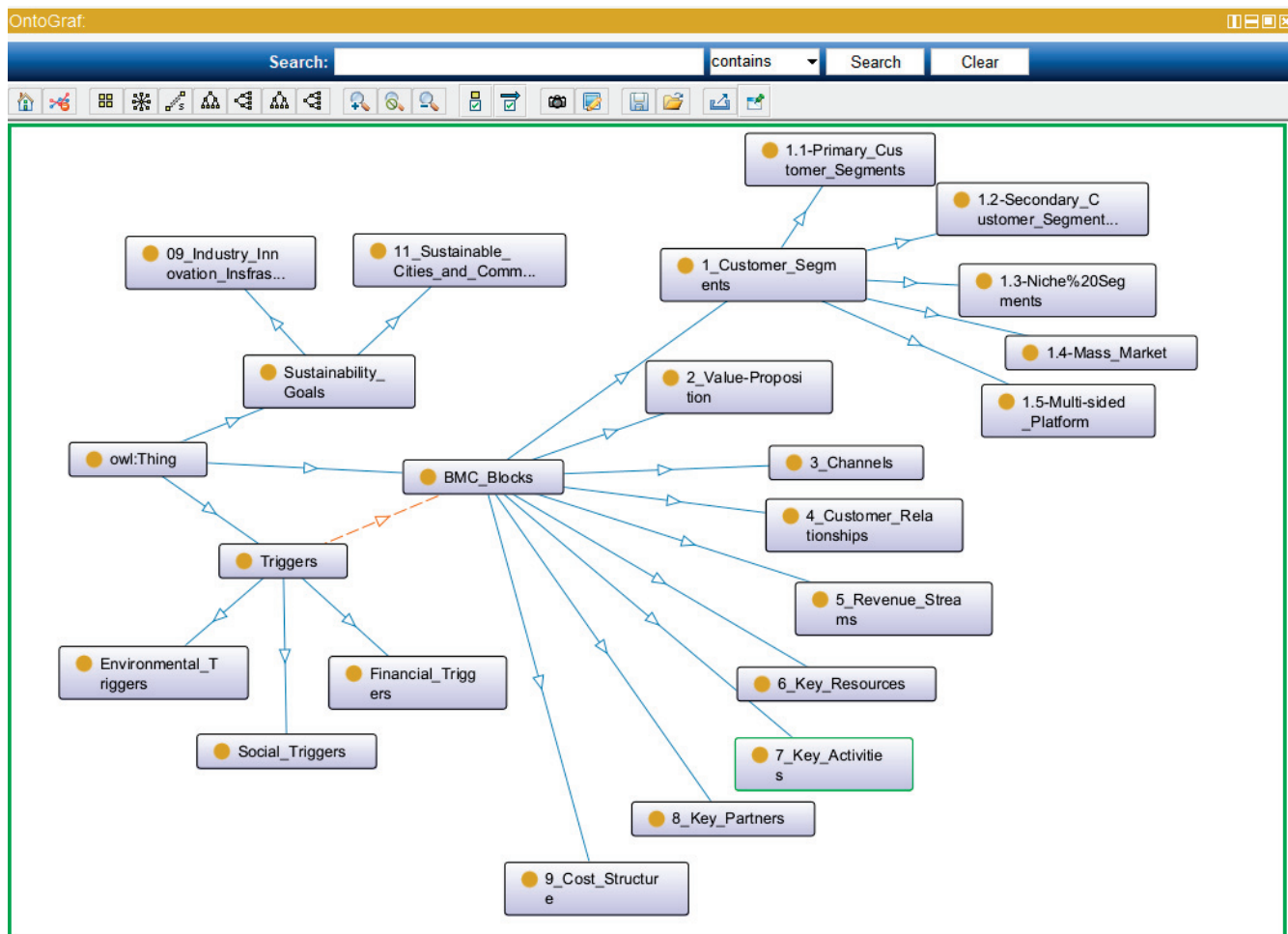


Figure 6. A simplified representation of the green business ontology created using Protégé 2. Three main ontological classes are highlighted: BMC_Blocks, triggers, and sustainability goals.

Additional teaching and learning support tools were created by designing an educational framework that utilizes generative AI, optimized through a graph retrieval-augmented generation (GraphRAG) process, to reference and access the knowledge produced by the research.

This initiative led to the development of a Green Business Recommendation system, a functional stack comprising a generative AI system, custom-built KGs, ready-made or extracted from the “unstructured” learning materials developed in the framework of the project, and a customized prompting guide.

The generative AI system was built using a locally deployed open-source large language model (LLM), functioning as an AI chatbot. The local AI chatbot was implemented to leverage educational materials developed as part of the InnoGreen project, along with the knowledge graphs GBTrig-KG and GBTeach-KG, serialized in RDF/OWL and/or GraphML formats. These materials and knowledge graphs were integrated into the AI chatbot’s vector database using retrieval-augmented generation (RAG) and knowledge graph retrieval-augmented generation (GraphRAG) technologies. The InnoGreen project’s learning materials, focused on green and sustainable entrepreneurship education, were preprocessed through the RAG pipeline, which consists of several phases:

- An unstructured document chunking phase,
- a concepts and relationships extraction phase,
- the construction of knowledge graphs, and
- the storage of the knowledge graphs into the AI chatbot’s vector database.

Once enriched with this specific information, the AI chatbot can respond to user queries, submitted by teachers and students, through tailored prompting.

By utilizing the educational content it was fed, the AI chatbot can deliver precise and relevant answers based on the project's specific educational materials.

The AI chatbot also demonstrated its ability to process and understand detailed information about business activities, identify relevant concepts, and extract green and sustainable practices employed by a business, when applicable.

In this regard, the Green Business Recommendation system can serve as a personal assistant for students, providing accurate answers to their inquiries about incorporating green or sustainable elements into business projects or practices.

4.4. Digital Materials for Learning and Teaching Green and Sustainable Entrepreneurship

The InnoGreen project's approach to supporting green and sustainable entrepreneurship education (EE) was founded on the belief that a diverse collection of educational resources—varying in format, content, and learning objectives—can better inspire and equip users to develop innovative business projects, improve existing business processes, or design new business operations.

This strategy combined traditional educational materials and pedagogies with newly developed content and instructional methods, all created within the InnoGreen project and integrated into the GSB e-learning platform.

As a common feature, all the educational resources were aligned with Bloom's taxonomy (Ruhl, 2024), focusing on levels 3 (application), 4 (analysis), and 5 (synthesis). Additionally, interactivity and visually engaging formats were prioritized to ensure an effective and appealing learning experience. As a result, in its final form, the GSB e-learning platform for green and sustainable business includes:

- Reading materials in various formats and online assessment exercises to build understanding of green and sustainable entrepreneurship concepts and their application in business contexts.
- Practical exercises to foster creativity in business creation and development.
- Gamification elements rewarding the completion of puzzle exercises, designed to enhance retention of key concepts in the field.
- Good practice guides for business modeling, along with case studies and scenarios demonstrating solutions for integrating sustainability and innovation into business projects.
- An interactive green business innovation canvas (GBIC) to help users incorporate sustainability triggers and innovation into their business models.
- Green business innovation matrices (GBIMs) inspired by the theory of inventive problem solving—TRIZ, (TRIZ Innovation Center, 2024), problem-solving schemes, to assist users in identifying green practices for their businesses (Savransky, 2000).
- The Protégé system as a conceptual learning assistant, allowing users to explore and query GBTrig and GBTeach ontologies interactively.
- The Green Business Recommendation system, a generative AI chatbot enhanced with a GraphRAG pipeline, providing answers to questions on implementing sustainability in business projects.

The last three tools—the TRIZ-inspired matrices, Protégé system, and the Green Business Recommendation system—are all knowledge graph-based and were specifically designed to foster conceptual learning, providing users with synthesized insights into green and sustainable business practices.

They aim to enhance problem-solving skills, critical thinking, and innovation capacity, empowering users to address challenges in sustainable entrepreneurship effectively.

4.5. Last Phases in Development of Digital Content Education in Green and Sustainable Entrepreneurship

From the three components of the e-learning system designed and implemented in the context of this research, the BM and BIN e-learning platforms are now fully operational in several European languages. The third component, the GSB e-learning platform, after the integration of traditional and research-based teaching and learning materials, is currently in its final development stage. All the three platforms, BM, BIN, and GSB, provide free access to all the educational resources they encompass and can be used for teaching and learning entrepreneurship in technical fields or for continuing education.

The final stage of the GSB platform development involves pilot testing to gather feedback from educators and learners on the provided educational content and services. This stage consists of three phases:

- Collecting feedback from educators, stakeholders, and entrepreneurs.
- Collecting feedback from students.
- Enhancing the platform's features and services based on user feedback.

The first phase, focused on educators' evaluation, has already been completed. While feedback has been generally positive, both the Protégé system and the GB Recommendation system were seen as innovative but overly technical.

Educators requested a more user-friendly interface to replace the need for direct generative AI prompting and SPARQL queries in Protégé.

The identified shortcomings can be now addressed using the wide range of open-source software and technologies currently available. Already existing integrated solutions, such as RAG pipelines for generative AI content training and tools for building knowledge graphs from unstructured materials, offer the potential to create frameworks with user-friendly interfaces for querying chatbots and receiving recommendations.

The next testing phase will take place in the spring and will involve integrating GSB educational materials into an undergraduate entrepreneurship course for computing engineering students. Feedback will be collected via questionnaires, such as the process used for educators.

Feedback from all users—educators and students—will inform the final phase of platform development, focusing on refining the educational content and tools to optimize the learning experience of users.

5. Discussion

5.1. Analysis of the Results from the Perspective of the Research Questions

To ensure coherence with the research objectives of the project, the results are discussed in relation to the four research questions that framed this study.

RQ1: How can digital systems and tools support traditional and innovative pedagogies in entrepreneurship education?

The digital tools created in the context of this study, such as the green business innovation canvas (GBIC) and AI-driven learning frameworks, enhance both traditional and conceptual learning approaches. These tools integrate interactive, problem-based learning experiences that allow students to explore sustainable business models in a structured, yet flexible, manner. The knowledge graph-based AI recommendation system further personalizes learning, enabling students to retrieve targeted information aligned with their educational needs. These findings confirm that technology-enhanced EE can complement conventional pedagogies by facilitating active engagement and fostering entrepreneurial mindsets.

RQ2: How can digital tools and innovative pedagogical approaches contribute to green and sustainable entrepreneurship education?

The integration of conceptual learning frameworks and AI-driven content generation has proven effective in supporting sustainable entrepreneurship education. By structuring learning content around real-world business triggers, students gain insights into eco-friendly practices through practical, experiential learning. Our study highlights that the GBIC and the TRIZ-inspired matrices effectively bridge the gap between theory and practice, providing learners with actionable tools for designing sustainable business models. These results emphasize that digital pedagogical approaches can foster a deeper understanding of sustainability principles, aligning with the increasing demand for eco-conscious business strategies.

RQ3: How can the digital tools and pedagogical approaches developed in this study foster students' creativity and innovation skills?

Findings from the pilot implementation suggest that interactive modeling tools, such as the GBIC, facilitate creative problem solving by enabling students to visualize and iterate on business models. Additionally, the AI-driven recommendation system, optimized through GraphRAG technology, enhances knowledge retrieval, allowing students to explore multidimensional relationships between sustainability principles, business strategies, and market dynamics. These outcomes support the idea that technology-enhanced learning environments provide a platform for students to develop innovative solutions, encouraging them to design businesses that balance environmental responsibility with economic viability.

RQ4: How can generative AI enhance the creation of effective digital content for technology-driven learning in green entrepreneurship?

The preliminary results are promising in what concerns the transformative potential of generative AI in structuring and delivering educational content. By leveraging knowledge graphs and retrieval-augmented generation (RAG) pipelines, the AI-based system personalizes learning, making complex sustainability concepts more accessible and actionable. The ability of generative AI to synthesize vast amounts of information and provide contextualized, user-specific recommendations reinforces its role as a powerful support mechanism for students and educators alike.

5.2. Contingencies with Other Aspects of the Socio-Economic Development

This research examined the role of digital technologies in entrepreneurial education for a green and sustainable economy. Two key aspects emerged as significant: the development of the digital economy and the impact of the digital divide.

The digital economy encompasses activities driven by digital technologies, such as e-commerce, online communication, services, and data-driven innovation. It relies on the internet, cloud computing, big data, and generative AI to enable efficient interactions, transactions, and decision making across industries. The digital economy enhances connectivity and communication, influencing employment, education, and access to resources and to economic activities. The digital economy also transforms traditional business models, including those centered on green and sustainable practices (OECD, 2024; Ozturk, 2024).

In this direction, a key finding from our study was the use of digital technologies by companies to implement eco-friendly practices in sustainable businesses. Approximately 40% of the sustainable and eco-friendly practices identified through field research, later expressed as triggers, were linked to the digital economy, through the strategies and activities proposed by these companies.

The digital divide refers to the disparity between individuals, communities, or nations with access to digital technologies and those without. This gap impacts access to the internet, digital literacy, and the use of technology for education, healthcare, and economic opportunities. Factors such as income, education, gender, and geography contribute to this divide, exacerbating socio-economic inequalities (Vassilakopoulou & Hustad, 2023; Lythreitis et al., 2022).

In this context, our proposed solutions for technology-enabled entrepreneurship education present a significant challenge: dependence on technological infrastructure. The e-learning platforms suggested for supporting green and sustainable entrepreneurial education heavily rely on internet access and technological infrastructure, which may limit accessibility in regions with insufficient technological resources.

However, this limitation is mitigated by an important benefit: the policy relevance of the study's outcomes. By addressing the digital divide, this research provides a framework for improving access to quality education in underserved regions.

5.3. Comparison of Current Study with Related Research

This section examines how the current article aligns with or diverges from other studies on comparable topics. By comparing methodologies, results, and conclusions, it identifies contrasts in approaches and the contributions of this research to the scientific discourse in the field, emphasizing its relevance in the area of technology-enabled learning for green and sustainable EE. The following topics and articles have been analyzed to achieve the comparison:

- “Green Technology in Education: Key to Sustainable Development” (Sadh, 2019) is an article discussing the role of green technology in education and its importance for sustainable development. It emphasizes the integration of green elements into educational programs to promote sustainability. While research work emphasizes sustainability, the current study focuses specifically on integrating technology-enabled learning into entrepreneurship education, with a detailed methodology for developing digital tools and pedagogical approaches.
- “Technology-Enhanced Learning and Education for Sustainable Development” (Polanco O’Neil, 2019) is an article exploring the intersection of technology-enhanced learning (TEL) and education for sustainable development (ESD). It discusses the challenges and innovations of using technology to support sustainable education. Both papers address the use of technology in sustainable education. However, our article goes further by detailing the development of a cloud-based system and specific e-learning platforms for green entrepreneurship, including the use of knowledge graphs and generative AI.
- “The Impact of E-Learning Technologies on Entrepreneurial and Sustainable Development” (Liu et al., 2023) is an article examining how e-learning technologies can be applied to entrepreneurship education, highlighting the benefits and challenges of integrating these technologies. The current article offers a more comprehensive approach, discussing the integration of e-learning technologies and also presenting a structured methodology for creating digital content and tools specifically for green and sustainable entrepreneurship.

5.4. Limitations

Green entrepreneurship is a dynamic field that constantly evolves with modern technologies and opportunities. Consequently, newly developed educational materials should, through field studies and analyses, reflect technological advancements and the innovative aspects of successful businesses. In this sense, our research within the project InnoGreen

focused on collecting and analyzing data from interviews with representatives of enterprises in eight European countries. This research enabled us to create up-to-date educational content, offering learners practical suggestions on how to include green practices in their business projects, and prompting companies to adopt eco-friendly procedures in their ventures.

However, there were some limitations to our research. While this study provides valuable insights into creating novel content and pedagogies for technology-enabled learning in green entrepreneurship, several limitations should be acknowledged:

- **Focus on specific technologies:** The research concentrated on the use of conceptual learning tools and generative AI. While these technologies demonstrate considerable potential, other emerging tools and pedagogical innovations were not explored. Integrating additional technologies, such as augmented reality, could enhance the scope and applicability of the proposed educational frameworks.
- **Short-term evaluation:** The effectiveness of the e-learning platforms and tools was assessed primarily through pilot studies and short-term feedback from learners and educators. Longitudinal studies are necessary to evaluate the sustained impact of these tools on learners' knowledge retention and entrepreneurial skills development.
- **Sample size and diversity:** The empirical research involved a limited number of entrepreneurs and educators from European countries. Although the findings revealed significant aspects of green business practices, the results may not fully represent the perspectives of entrepreneurs from other regions or socio-economic contexts.

Our research should ideally be conducted in a large number of regions or countries at various stages of social or economic development, with a larger sample size. Since the enterprises that participated in the InnoGreen project ranged from micro-enterprises to SMEs, future studies could target a more extended sample.

Using a larger number of respondents and random sampling could yield additional insights. Factors such as economic development levels, national culture, and regional sustainability legislation could also influence the results.

These limitations highlight areas for improvement and provide opportunities for future research. Expanding the geographical reach, incorporating additional technologies, conducting long-term evaluations, and addressing technological barriers are recommended steps to enhance the generalizability and effectiveness of this research.

- Nonetheless, the model developed from this research, utilizing trigger-based case studies, good practice guides, and creativity-supporting learning tools, led to the creation of original educational content and pedagogy.

6. Concluding Remarks

6.1. Study Results and Benefits

A vast amount of quality resources on entrepreneurship, particularly on green and sustainable approaches in businesses, is now available through general knowledge platforms such as the Wiki suite or generative AI systems such as OpenAI ChatGPT, Google Gemini, or Microsoft Copilot.

However, synthesizing core concepts, highlighting their interrelations, and extracting key insights from practical experiences can provide a novel approach to entrepreneurial education focused on eco-friendliness and sustainability. This approach can complement traditional methods by adding a fresh dimension to the information delivery to learners. Additionally, the computational representation of ideas and concepts ensures continuous content updates to reflect advancements in green and sustainable entrepreneurship.

This educational strategy and approach has been implemented in the GSB e-learning platform through a suite of interactive tools, enhancing users' ability to acquire and apply knowledge effectively while stimulating creativity in designing business models. Through support of these tools, students can learn essential aspects from real-world examples and be better prepared to integrate eco-friendly practices into their business projects and future ventures. In this sense, the study results, findings, and benefits are the following:

- Development of a cloud-based system: the article introduces a cloud-based system for entrepreneurship education (CSEE) that includes three e-learning platforms tailored for sustainable entrepreneurship education.
- Developing a methodology for creating digital content: the study presents a step-by-step method to develop digital learning content using data on green businesses gathered from real-world sources, then analyzed and converted them into a structured computational format with the help of advanced IT technologies, such as the generative AI.
- Integration of knowledge graphs: The use of knowledge graphs (KGs) to support conceptual learning is a significant contribution. KGs help organize and represent knowledge in a structured format, facilitating data integration and retrieval. This approach enhances students' understanding of complex concepts and relationships in green entrepreneurship.
- Generative AI and GraphRAG: The article discusses the integration of generative AI chatbots and graph retrieval-augmented generation (GraphRAG) frameworks. These technologies improve the quality and relevance of AI-generated content by incorporating relational knowledge from pre-constructed graph-based data structures.
- Green business innovation canvas (GBIC): The introduction of the GBIC as a digital framework for designing eco-friendly business projects is another original contribution. This tool helps users balance environmental objectives with profitability, promoting sustainable business practices.
- Ontologies for learning and teaching: The development of the green business triggers ontology (GBTrig-O) and the corresponding knowledge graph (GBTrig-KG) provides a structured framework for integrating green business practices into entrepreneurship education. This ontology supports the creation of educational content that reflects real-world knowledge interrelations.

The study findings and results also demonstrate the feasibility of integrating technology-enabled learning tools, such as generative AI, along with conceptual learning frameworks, into green and sustainable EE. This integration resulted in following benefits:

- Practical implications for educators: the digital tools and pedagogical methods developed in this research provide a scalable model for embedding sustainability into entrepreneurship curricula.
- Practical relevance for users: the concise, easy-to-understand instructional content provided by the conceptual learning tools can accelerate comprehension of principles and processes, fostering goal-oriented and innovation-driven learning.
- Future applications: the study's integration of advanced digital technologies sets a precedent for future innovation in EE, especially in the context of sustainability.

This research bridges critical gaps in entrepreneurship education by combining sustainability principles with cutting-edge technologies, such as generative AI, for both research and educational purposes.

The findings highlight actionable solutions for educators and policymakers to promote eco-friendly entrepreneurship, aligning with global sustainability goals.

6.2. Future Trends and Emerging Issues in Technology-Enabled Learning for Entrepreneurship

The rapid evolution of technology continues to transform education, introducing novel approaches to learning. Understanding these trends is essential for designing inclusive, sustainable, and effective educational frameworks that address global challenges. The future trends can include the following developments:

- **Advancements in educational technologies:** The integration of AI, virtual reality (VR), and augmented reality (AR) into education is likely to reshape how learners interact with content. These technologies could reduce the digital divide by providing immersive learning experiences, even in resource-constrained settings. However, their implementation requires significant investment and training for educators.
- **Increased focus on lifelong learning:** As industries continue to evolve, there will be a growing demand for lifelong learning programs to help individuals upskill and reskill. E-learning platforms tailored for sustainable entrepreneurship could play a key role in bridging the skills gap, especially in marginalized communities.
- **Decentralized and open education:** Blockchain and decentralized platforms might enable more equitable access to learning by allowing learners to document achievements securely and access open educational resources. This trend could mitigate the digital divide by democratizing education.

In contrast to advancements in the field, the emerging challenges in technology-enabled learning for entrepreneurial education may include the following:

- **Accessibility and infrastructure challenges:** The digital divide remains a critical barrier in many regions where access to technology and reliable internet is limited. Addressing this issue will require collaborative efforts between governments, private sectors, and educational institutions to ensure equitable access.
- **Digital literacy gaps:** Even with access to technology, a lack of digital literacy can hinder participation in online education. Efforts to build digital skills among learners and educators must accompany the deployment of advanced technologies.
- **Economic disparities and equity:** While digital tools can reduce some inequities, they may also exacerbate others if technological advancements disproportionately benefit privileged groups. Future strategies should focus on designing inclusive systems that cater to diverse socio-economic backgrounds.
- **Data privacy and ethical concerns:** The increasing use of AI and data-driven systems in education raises concerns about data privacy and algorithmic biases. Future developments must prioritize ethical frameworks and transparency in technology use.

As technology evolves, its role in education will expand, bringing both opportunities and challenges. Addressing issues such as accessibility, digital ethics, and the digital divide is important to ensure equitable learning environments. By the emerging trends, educators and policymakers can create technology-enabled solutions that foster innovation and inclusivity, building the way for a more connected and empowered future in education.

Particularly, in what concerns the context of entrepreneurship education, future challenges will include ensuring that digital tools foster not only accessibility, but also critical thinking and innovation in sustainability. As technology evolves, educators must balance the need for scalable digital solutions with the demand for human-centric, value-driven learning experiences.

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Article

Gender and Digital Rights: An Empirical Study Among Young Entrepreneurs

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Abstract: Digital rights have been little studied from a gender perspective until now. This research analyses, from a gender perspective, the characteristics of young entrepreneurs, the use of social media in their entrepreneurial projects, and their observance of digital rights. It uses a descriptive methodology based on the analysis of 144 successful cases of youth entrepreneurship. Percentage analysis and Chi-Square tests were carried out to determine gender differences. The results reveal that most of the entrepreneurial projects are led by men. The sectors of choice for female entrepreneurs seem to be, among others, the manufacturing industry and health activities. The most used social media are websites and Facebook. Overall, no statistically significant gender differences were found in terms of respect for digital rights. The results of this study point to the need to design and develop training actions aimed at gender equity in youth entrepreneurship and training in the observance and respect of digital rights. The results of this study have social implications insofar as they highlight the differences between genders in the development of entrepreneurial projects and the importance of protecting and respecting digital rights in social media, as established by international standards.

Keywords: entrepreneurs; gender; digital rights; information communication technology; social media

1. Introduction

In recent decades, a number of changes have been taking place, resulting in major repercussions in areas such as politics, economy and society, among others. The COVID-19 pandemic had serious consequences, mainly in terms of human losses. Moreover, with the conflict in Ukraine, the citizens have witnessed the disruption of the supply chain and an energy crisis with severe repercussions. The interplay of all these events is preventing a return to the relative stability (in terms of economy, employment, growth, etc.) which existed in the pre-pandemic era (Ionescu-Somers & Shay, 2022). Another aspect that has been adversely affected by the above-mentioned events has been the labour market. Society has witnessed rising unemployment figures in many social groups, but mainly in vulnerable populations such as women and young people.

Unemployment in the euro area, according to Eurostat (2023) data from July 2022 to 2023, has decreased from 6.7% to 6.4%. However, among young people, unemployment has risen from 13.8% to 14.5%, while, among women, although it has fallen from 7.1% to 6.8%, it is still higher than among men—in which it has fallen from 6.3% to 6.2%. In other words, we find, on the one hand, that youth unemployment worsened in 2023, despite the

fact that it was already double the general rate, and, on the other hand, we observe that unemployment among women is higher than both the general rate and the rate for men. According to the Organisation for Economic Co-operation and Development (Organisation for Economic Co-Operation and Development [OECD] & European Union, 2020), Spain is, among the analyzed nations, the first country in terms of unemployment rate in all age groups. According to data from the Spanish government (Public Service of State Employment [SEPE], 2023), Andalusia is the autonomous community with the highest unemployment rate (26%). Spanish female unemployment in July 2023 is the second highest in Europe after Greece, at 14.9% and 14.8%, respectively (Eurostat, 2023). In the case of Andalusia, the percentage of unemployed women is higher than that of men (454,286 people compared to 293,859) and is higher in all Andalusian provinces (SEPE, 2023). Considering the employment sectors where women mainly develop their activities, it can be observed that the service sector is at the head of female unemployment, both at the Spanish national level and at the Andalusian regional level (SEPE, 2023).

In this context, entrepreneurship is presented as a way for people to create their own professional prospects through the development of an entrepreneurial project. The term entrepreneur has been studied from different theoretical perspectives which have influenced its different conceptions. Zhao et al. (2021) noted that the concept has been influenced by three schools of thought: Austrian, German and neoclassical. These influences have shifted the concept of entrepreneurship from being understood as the ability to resist in uncertain environments to being conceived as the ability to take risks, to identify and seize opportunities and to be able to innovate. These authors also point out that there seems to be some agreement that entrepreneurship is the ability of the individual to discover and use identified opportunities to achieve observable rewards.

Social media (SM), in the form of social networks (e.g., Facebook, Instagram or Twitter), blogs and websites, are increasingly occupying an outstanding place in the development of entrepreneurship. People who begin with the use of these technologies have the possibility of widening their range of action to reach different markets, thus making their brand, their values and qualities known (Naudin & Patel, 2017). Thus, entrepreneurship becomes a key element to encourage economic development and employment creation (Carvalho et al., 2021). In this sense, the gender perspective cannot be ignored as a crucial factor in entrepreneurial initiative, as it has a greater influence than age (Vodă & Florea, 2019). Women's entrepreneurship makes use of SM and allows their projects to be made visible across borders.

However, the emergence of these information and communication technologies (ICTs), the internet and social networks also reflect the so-called digital divide in terms of access and use as well as the reproduction of existing inequalities in society, including gender and age (Herranz et al., 2017). ICT and gender inequalities in entrepreneurship are currently under-researched, as Gawel and Minska-Struzik (2023) state.

2. Theoretical Framework

2.1. Youth Entrepreneurship, Gender and Intersectionality

Scientific literature focusing on youth entrepreneurship and gender is scarce. Aljuwaiber (2021) reviewed 271 articles published between 2009 and 2019 and found that gender and entrepreneurship (69 articles) and youth entrepreneurship (41 articles) are relevant topics. However, no studies were found which combine both topics. There is little previous literature focusing on youth entrepreneurship in relation to gender.

In terms of the subject matter of these articles, Ilynh (2015) investigates youth entrepreneurship from economic, social and psychological perspectives. Stough (2016) conducts an analysis of research on entrepreneurship and economic development where he

considers aspects such as youth entrepreneurship and gender. Sharma (2018) investigates the role of gender and culture in young people's intentions and perceptions of barriers to entrepreneurship. Finally, Weiss et al. (2023) analyze intra-group support and embeddedness in the development of women's youth entrepreneurship.

With regard to research on youth entrepreneurship, it should be noted that research on youth entrepreneurship is relevant, as stated by the Organisation for Economic Co-Operation and Development [OECD] and European Union (2020) and the European Union (Duell, 2018), because of the need to address high levels of youth unemployment through the development of entrepreneurial projects. This situation, and the economic and social conditions, pose new challenges for young people (Wasilczuk & Karyy, 2022). They are distinguished by being determined and adaptive, which makes them a subject of study. However, unemployment figures, as described above, not only affect young people and make them a target for the development of entrepreneurial projects, but women also require special attention (Stough, 2016).

Research by Hamdani et al. (2023) points to the importance of women and female entrepreneurship in both social and economic development in many countries. Women have shown that they are capable of recognising and taking advantage of the different opportunities that the current crisis situation offers and, thus, of further contributing to the economic growth of their area, region or country. Regarding sectors of activity where these women are entrepreneurs, almost half of them work in the wholesale and retail trade. In addition, one in five women develop their projects in the public sector, in health, education and social services (Global Entrepreneurship Monitor, GEM, 2022). Nevertheless, the proportion of women in technology-related sectors is 2.7% as compared to 4.7% for men.

However, there are certain barriers, both internal and external, that women face when it comes to entrepreneurship. Although nowadays the number of women entrepreneurs is still increasing, the support given to them by governments and institutions is not enough (Ionescu-Somers & Shay, 2022). According to the Global Entrepreneurship Monitor Report 2021/2022 (GEM, 2022), women are less active than men on a global level. Out of every five entrepreneurs, two are women, in the case of projects in the early stages of development. In turn, according to this report, at a global level, women account for one in three entrepreneurs in high-growth and innovative projects.

The concept of intersectionality (Crenshaw, 1989) shows that various motives or factors interact with each other, giving rise to other sources of inequality. In our case, we are talking about gender and age. Bignotti and Le Roux (2018) highlight the importance of entrepreneurship spirit and entrepreneurship as a solution to youth unemployment as related to gender. These authors point out that women secondary school students have a greater need for achievement than their male peers, and that they rely more on their mentors and contact networks to overcome certain difficulties, e.g., access to funding. Sharma (2018) investigates whether gender has a significant influence on young people's entrepreneurial intentions, finding that female students have less entrepreneurial intentions than males. Meanwhile, Arias et al. (2021) point out the demographic factors which affect rural entrepreneurship in young people, concluding that gender and age are interacting factors that influence project development. According to these authors, women are less entrepreneurial and those under 24 years of age are more likely to report a desire not to be entrepreneurial. Finally, Hamdani et al. (2023) point out in their research that women's perceptions of gender stereotypes and perceived social support mediate their self-efficacy in terms of entrepreneurial intention.

In light of the above, it seems that there is scientific evidence of the role that age and gender play as an intersection in the intention and subsequent development of entrepreneurial projects. This makes them topics of scientific interest.

2.2. Social Media (SM) and Entrepreneurship

Social media, social networks (Facebook, Instagram, Twitter), blogs and websites, among others, have become an essential element for entrepreneurs (Secundo et al., 2020). Thanks to these technologies, people can reach different markets, promote their brands (Naudin & Patel, 2017) and influence their innovation (López-Lemus et al., 2024). In the review carried out by Secundo et al. (2020) on the impact of social media on entrepreneurship and its process, these authors highlight, firstly, that there is scarce literature on this impact. Secondly, it focuses on four lines: the use of social media in entrepreneurial learning and self-employment; the use of social media as a tool for project promotion (purpose of this research); social media in itself as a potential entrepreneurial opportunity; and, finally, social media as an enabler when creating entrepreneurial networks.

Regarding the relationship between SM, young people and entrepreneurship, Shi et al. (2022) argue that both the use of SM and e-commerce provide key opportunities for young people to become entrepreneurs.

Naudin and Patel (2017) note that the public nature of SM allows, in the case of women, for the presentation of entrepreneurial experience, values and qualities. In this line, Manolova et al. (2020) claims that women entrepreneurs have taken advantage of the opportunities offered by the pandemic to digitise their business models, a fact that offsets the assumption that women use technology less (Raman et al., 2022).

In addition, Steel (2021) points out that, increasingly, educated women are starting their projects by using digital devices and social networks. Through these online media, women offer their products and are able to cross borders. They offer their products to international markets, obtain international products to further develop their project and can bring variety and originality to their products. Nicolescu et al. (2022) add that the use of these platforms allows global inequalities to be reduced by enabling the most disadvantaged people to be incorporated into global economic flows. Specifically, in their research—contextualised in small businessmen and women in Chile, Italy and India—they highlight the advantages of using these platforms.

Women positively value the use of technology in their entrepreneurial projects, as they see it as a complementary job and value the advantages of the flexibility and work–life balance that this type of work offers them, enhancing their contribution to the community. Brydges and Hracz (2019) also point out the advantages that websites and social media have had for the fashion industry and indicate that Instagram is the most widely used channel for promoting brands and interacting with the public. Social networks also have the advantage of their low cost and the possibility of direct sales. In short, there is evidence of the advantages that the use of SM offers women entrepreneurs when selling their brand and products. However, the relationship between the use of social media and female entrepreneurship needs further research. In the review of Raman et al. (2022) on female entrepreneurship between 1991 and 2021, the authors identify the three most outstanding themes: barriers and catalysts to female entrepreneurship; cultural and social practices, such as childcare; economic development and female entrepreneurship.

2.3. Digital Divide and Gender

As shown in the previous subsection, ICTs have brought about a great change in many areas and activities, including entrepreneurship, but they also serve to reproduce social and political inequalities (Herranz et al., 2017). Among these inequalities, the intersectionality between gender and age appears again.

The differences that occur between individuals, social groups and even countries when it comes to accessing and knowing how to use ICTs are referred to as the digital divide (Acosta-Velázquez & Pedraza-Amador, 2020). Bokhari and Awuni (2023) argue

that digitisation reflects or exacerbates pre-existing inequalities, and that gender, age, education and socio-economic status significantly influence digital inclusion, indicating persistent inequalities and barriers. Saavedra-García (2023) states that this gap is among the barriers faced by women when it comes to entrepreneurship. A barrier that hinders the digitalisation of women's entrepreneurial projects and, therefore, access to new markets, the ability to diversify their offer and expand the market and sales channels, weave new networks, access government training and funding programmes or even access and create women's networks, among others.

Therefore, as stated by Dini et al. (2021), reducing this gap is essential for young women's SMEs to add value and become more productive. The elimination of this barrier requires the intervention of governments to create public policies and programmes that reduce this gap and favour the digitisation processes of women entrepreneurs. In fact, Goal 5.b of the Sustainable Development Goals [SDGs] already seeks to 'Improve the use of enabling technology, in particular information and communications technology, to promote the empowerment of women' (United Nations, n.d.-a, para. 6) and, in terms of reducing intersectional discrimination, Goal 10.2, where 'By 2030, empower and promote the social, economic and political inclusion of all people, regardless of age, gender, disability, race, ethnicity, origin, religion or economic or other status' (United Nations, n.d.-b, para. 7). It is worth considering that, if gender and age are variables that influence this digital divide, hindering the development of entrepreneurial projects, they may also be interfering with the knowledge and application of digital right and principles in their projects on social networks.

2.4. Digital Rights and Principles

The European Declaration on Digital Rights and Principles for the Digital Decade (European Commission, 2023) says that digital technologies are changing every area of our lives, as well as opening up new and unprecedented opportunities. The COVID-19 pandemic has undoubtedly hastened the role and perception of digitalization in our societies and economies.

The pace of digital transformation has brought with it innovations and tools that allow us to better address social challenges. At the same time, digital transformation has provided easier access to education, training and information and has opened up new spaces for public discourse. The spread of digital technologies has enhanced freedom by allowing people to connect with each other even in the remotest parts of the world, but it has also opened up new opportunities for citizens, workers and consumers. The spread of digital technologies has enabled the creation and growth of businesses while allowing for the inclusion of disadvantaged groups and the progress of society as a whole (European Commission, 2023).

However, the availability of and access to these digital technologies and the data they produce has given rise to new risks with serious consequences for citizens, their security and even the foundation of societies. These risks concern privacy, security of personal data, harmful and unsafe content, cybercrime and abuse, among others. Neither citizens nor businesses should have fewer rights because they work in digital environments. To guarantee these fundamental rights and to ensure that people can take advantage of their opportunities in these environments, the European Union has taken preventive measures, although this is not an easy task given the complex nature of the use of these technologies and their solutions. For their part, start-ups and entrepreneurial companies face new challenges internally and externally to social media in order to make their business ideas visible and marketable (Oppong et al., 2020).

In the Declaration on Digital Rights and Principles, the European Union also presents its commitment to ensure that this digital transformation protects citizens and is safe and sustainable. A transformation where people are at the center of all actions and measures. All of this is in line with the fundamental values and rights established by the European Union. Among the principles set out in this Declaration (European Commission, 2023) are the following:

- Digital technologies must protect people's rights, support democracy and ensure that all those involved in the digital area act responsibly and safely.
- Technology should bring people together, not divide them. Everyone should have access to the Internet, digital skills, digital public services and fair working conditions.
- People should benefit from a fair online environment, be safe from illegal and harmful content, and be empowered when engaging with new and evolving technologies, such as artificial intelligence.
- Citizens should have the opportunity to participate in the democratic process at all levels and to have control over their own data.
- The digital environment must be safe and protected. All users, regardless of age and condition, must be empowered and protected.
- Digital devices must account for sustainability and the ecological transition. Citizens need to be aware of the environmental impact and energy consumption of their devices.

As a response to the above, some European countries have drafted their own Charter of Digital Rights. This is the case of Portugal, with the Portuguese Charter of Human Rights in the Digital Era (Lopes & Nunes, 2021), and Italy, a pioneer with its Internet Bill of Rights (Camera of Italy, 2015). Specifically, in Spain, the Spanish Digital Agenda 2025 (Government of Spain, 2021) sets out, among its 10 strategic goals, the drafting of this charter. This document aims to be the reference framework for ensuring the rights and obligations of citizens and companies in the digital age. This charter is based on the developments in personal data protection and the guarantee of digital rights and addresses the following rights: (a) right to freedom, i.e., right to identity, data protection, pseudo-anonymity, non-traceability, cybersecurity and digital inheritance; (b) right to equality, including non-discrimination, access to the Internet, protection of minors, universal accessibility and access gaps; (c) the right to participation and shaping of the public space, i.e., neutrality, freedom of expression and information, receiving accurate information, participation, digital education and access to public services through these technologies; (d) the rights of the working and specific environment; and, finally, (e) the guarantees of those rights and the effectiveness of what is stated in this document.

However, the majority of young entrepreneurs do not know or do not have sufficient knowledge of these regulations, their applications and the risk of not complying with them when it comes to making their entrepreneurial projects visible on the internet or social networks (Barbosa et al., 2024).

2.5. Entrepreneurship Support Centres

According to Colombo et al. (2019) and Spigel and Harrison (2018), within the entrepreneurial ecosystem there are organisations whose aim is to support and develop entrepreneurship. These organisations provide advice, financing, opening up to other markets, infrastructures and mentoring, among others (Labudová & Jánošová, 2019; Nowiński & Rialp, 2016; Sarkar et al., 2019). Among these organisations is the European Commission itself, which has launched a website (European Commission, n.d.) where citizens can find information on how to create an entrepreneurial project. In European countries there are

organisations which support entrepreneurship, such as the Local Enterprise Office (n.d.) in Ireland or the Chamber of Commerce (KVK, n.d.) in the Netherlands.

For Andalusia (Spain), which is the target community of this research, the leading organisation in terms of entrepreneurial advice is the Andalusian Public Foundation Andalusia Starts Up. This is a public entity belonging to the Regional Government of Andalusia and, more specifically, attached to the Ministry of Knowledge, Research and Universities. It was created with the objective of helping to start up, develop and consolidate business ideas, aware of the value of entrepreneurs as creators of wealth and employment (Siles-Moreno, n.d.).

Through its more than 250 Andalusian Entrepreneurship Centres (CADE, by its acronym in Spanish) spread throughout the Andalusian region, this foundation offers free services to entrepreneurs who wish to create a business project or to companies which are already established, grouped into three areas: (a) support for the entrepreneurial project and the creation of the company by means of information, communication and personal attention; project design and business plan; assistance in setting up the company; accompaniment, incubation and tutoring; mentoring by experienced professionals; (b) support in the strengthening of business projects by offering accommodation, training, consultancy, management tools, assistance in strategic decision making; and, finally, (c) promotion of the entrepreneurial culture with actions within education in entrepreneurial skills, the promotion and guidance of entrepreneurial initiative and the development of entrepreneurial activity in the local environment.

On the basis of the above, the general objective of this research is to analyze the differences between genders in young entrepreneurial projects, both in the observance of digital rights and in the type of SM used to advertise each project. Specifically, it examines the issue by asking the following questions:

- Objective 1. What are the characteristics of young entrepreneurs, their projects and business activity according to gender?
- Objective 2. Are there statistically significant differences between men and women in the type of SM used to promote their entrepreneurial projects?
- Objective 3. Are there statistically significant differences between men and women in the observance of digital rights in the SM?

3. Materials and Methods

A descriptive methodology has been used in a multiple case study. We have reviewed the initiatives contained in the Andalucía Emprende program—developed in the CADEs. A total of 144 entrepreneurial proposals were used to analyze the entrepreneurs, their projects and their SM. This study complies with the ethical requirements of the University of Granada (2019).

3.1. Sample

The participants were 144 entrepreneurs. The average age of the participants was 24.58 years, $SD = 4.15$. A total of 144 SMs of the entrepreneurial projects were analyzed. The number of companies created in 2022 in the Autonomous Community of Andalusia was 12,597 (Junta de Andalucía, 2022); 460 projects were hosted on the institutional platform, of which 220 corresponded to young entrepreneurs. Considering sampling and representativeness requirements, a confidence level of 95%, and an error of 5%, this study had a sample that exceeded the minimum size required to be representative (population 220, minimum sample 141).

3.2. Data Structuring and Analysis Procedure

For this study, two parallel processes were carried out: on the one hand, the selection of people and entrepreneurial projects; on the other hand, the construction of a grid for the analysis of the projects.

Process 1. The data were structured on the basis of the information contained in the Andalucía Emprende program and the SMs of each of the entrepreneurial projects. The projects were located on the website of the project bank and considered successful experiences and cases (Andalucía Emprende Fundación Pública Andaluza, n.d.). Afterward, the entrepreneurs who had started up at an age of less than 29 years were selected.

Process 2. Six researchers have constructed a grid (Supplementary Materials) for coding information. The grid has been based on the Charter on Digital Rights document (Ministry of Economic Affairs and Digital Transformation, 2021), which aims to articulate a reference framework that safeguards citizens' rights in the new digital reality. Fifty normative documents were also used with the following descriptors: digital rights, digital skills, internet and social responsibilities, digital entrepreneurship, young entrepreneurs and the European Union Legal Framework. Subsequently, documents related to at least one category of digital rights (Government of Spain, 2021; European Commission, 2023) were selected, and, finally, documents that explicitly refer to one of the indicators were identified and selected. Afterward, an item pool was created, and an interdisciplinary discussion group was set up with two rounds of discussion for proposals to improve the grid. Later, the grid was validated by experts in entrepreneurship and digital rights.

The final version of the analysis tool consists of four sections: (a) socio-demographic and entrepreneurial project data (nine items) and other groups of rights based on those identified in Gallego-Arrufat et al. (2023); (b) digital rights of equality and participation, including the right to universal access, participation, information and digital education (EPDR, 11 items); (c) digital rights of freedom, including the right to privacy, identity, security and protection of privacy (FDR, 10 items); (d) digital rights of development, creation and sustainability, including copyright, exploitation of information and participation, data management and environmental protection (DCSDR, six items).

The data obtained were processed with the statistical software SPSS v. 25. Six items were removed because they were not of research interest (e.g., name of the member who extracted the information, province...). Inter-coder reliability was performed in order to ensure a degree of conformity and concordance between the three researchers in the assignment of the information contained in the selected cases. This was achieved by performing Krippendorff's alpha. In a first round, seven cases with Krippendorff's alpha below 0.67 were obtained, three cases with Krippendorff's alpha between 0.67 and 0.8, and 16 cases with Krippendorff's alpha higher than 0.8. According to Krippendorff (2004, pp. 241–242), data with reliabilities whose confidence interval is below the minimum acceptable (not less than 0.67) should not be accepted. Data between 0.67 and 0.8 and an acceptable reliability, with alpha above 0.8, can be considered beyond reasonable doubt. For this reason, after clarification of the differences found, a second round of inter-coder agreement was carried out, obtaining an alpha above 0.8 in all cases except one.

Reliability was analyzed through the Kuder–Richardson coefficient, KR-20, which De Vellis (2017) says is the appropriate coefficient for dichotomous variables. A result of $\alpha = 0.94$ was obtained; this result is almost perfect (Landis & Koch, 1977, p. 165).

In order to detect differences between the level of protection of the different digital rights (objective 3), three ranks have been established:

- Rank 1, between 0 and 3 digital rights have been registered—low level;
- Rank 2, between 4 and 7 digital rights have been registered—medium level;
- Rank 3, between 8 and 11 digital rights are registered—high level.

These levels are obtained by counting rights in the three sections analyzed in each case: digital rights to equality and participation; to freedom; to development, creation and sustainability. The information used on SM (item 9) refers to the dissemination of media types by the entrepreneur, (e.g., websites, blogs, Facebook, Twitter, Instagram, ...). Twelve SM typologies were considered, with nine of them remaining in the final version because no cases were found or because they were specific to a particular business activity (e.g., Tripadvisor).

4. Results

The Kolmogorov–Smirnov normality test was conducted on the data concerning digital rights, and $p < 0.05$ was obtained. This is normal for large samples. However, after checking the histograms and plots (Normal Q-Q Plot), the scores appear to be reasonably normally distributed.

4.1. Objective 1: What Are the Characteristics of Young Entrepreneurs, Their Projects and Business Activity According to Gender?

Out of the projects analyzed, male projects account for 76.4%, while female projects account for 23.6%. Regarding the age of the entrepreneur at the start of the project, Figure 1 shows the distribution.

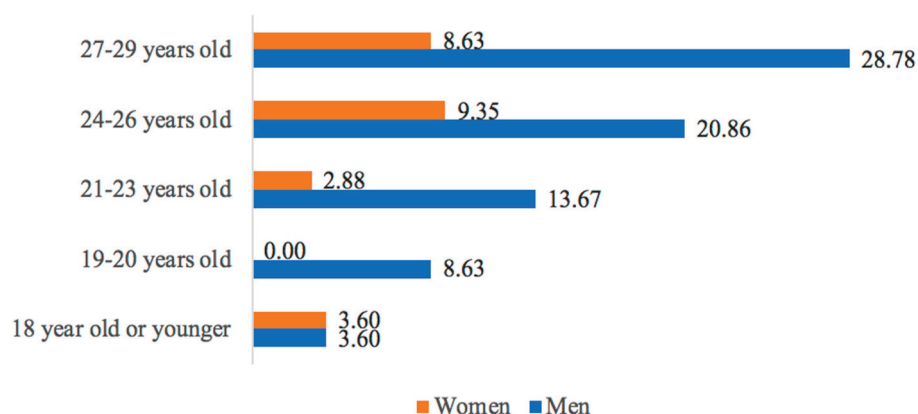


Figure 1. Percentage of cases according to age at starting up and gender.

Figure 1 shows that most of the men start up in a higher age band than women. That is, while most men start up between 27 and 29 years old, women start up between 24 and 26. At younger ages (18 years old or below), men and women undertake in a similar way. It is worth noting that, between the ages of 19 and 20, no female entrepreneurs were found in the cases analyzed.

In the item on economic activity, a difference in the percentages between men and women can be seen.

Figure 2 shows gender differences. The difference is especially apparent in the manufacturing industry and in activities related to agriculture, animal husbandry, forestry, and fishing. However, equal percentages were found in other sectors (e.g., accommodation and food services, education). In fewer cases, more female entrepreneurship was found than male entrepreneurship (e.g., health and social services, water supply).

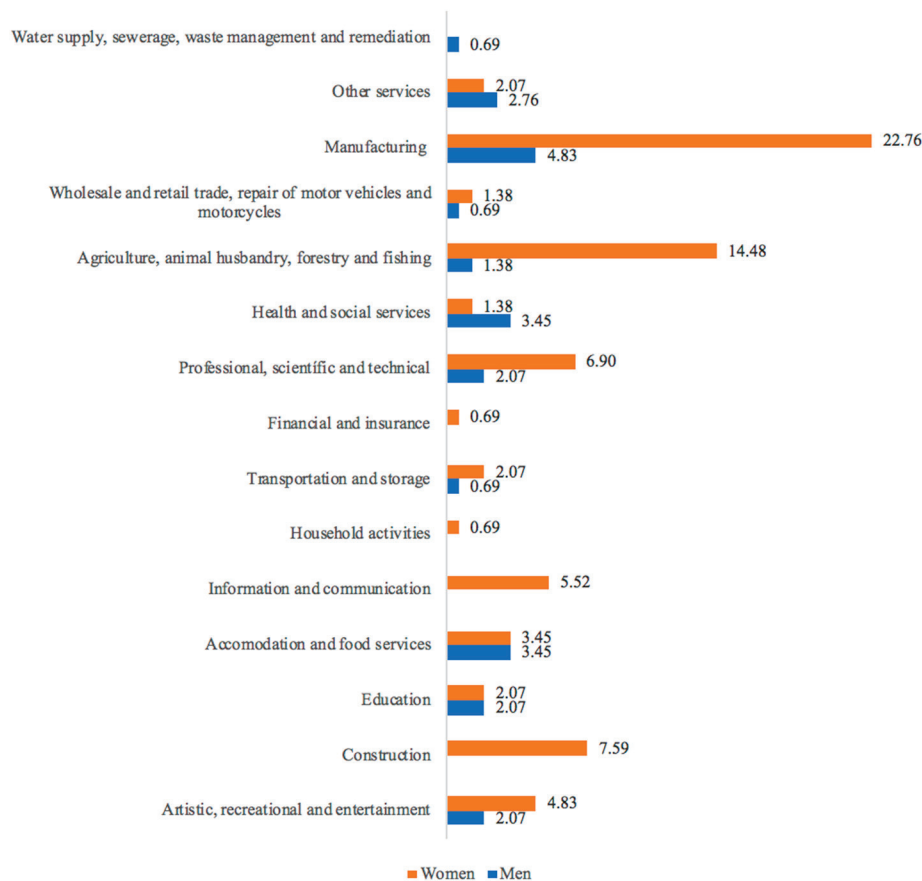


Figure 2. Percentage of cases according to economic activity and gender.

4.2. Objective 2: Are There Statistically Significant Differences Between Men and Women in the Type of SM Used to Promote Their Entrepreneurial Projects?

To answer this objective, an in-depth analysis of what the SM used by the young entrepreneurs was and what they contained was carried out. The results are shown in Figure 3.

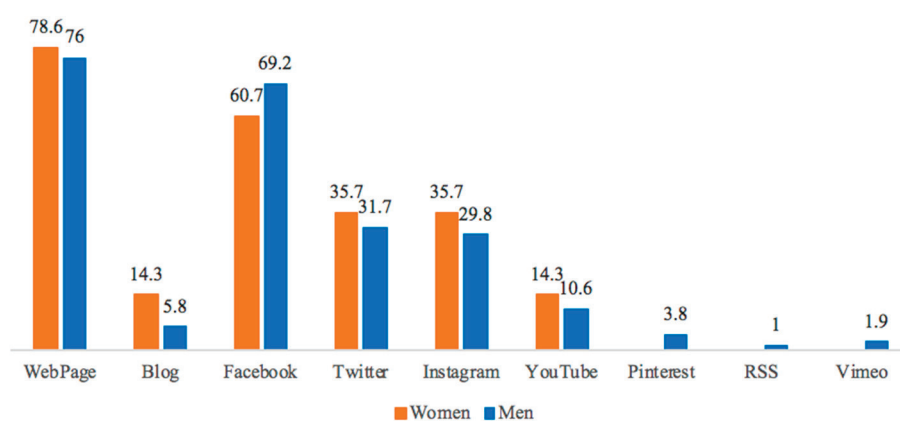


Figure 3. Percentage of SM used by men and women.

Other SM, such as Flickr and TikTok, have not been used by any entrepreneur. Figure 3 shows that the two forms of SM that are most popular, both among men and women, are websites and Facebook. We can consider that both groups use them jointly. Other young entrepreneurs, both men and women, also use Instagram and Twitter, and, to a lesser extent, YouTube or a blog. In no case did women use Pinterest, RSS or Vimeo.

A Chi-square test for independence (with Yates Continuity Correction) indicated no significant association between gender and SM typology (Table 1).

Table 1. Chi-square test to SM by gender.

Webpage	Chi-square (1, $n = 132$) = 0.00, $p = 0.97$, $\phi = 0.02$
Blog	Chi-square (1, $n = 132$) = 1.23, $p = 0.27$, $\phi = 0.13$
Facebook	Chi-square (1, $n = 132$) = 0.39, $p = 0.53$, $\phi = -0.07$
Twitter	Chi-square (1, $n = 132$) = 0.03, $p = 0.86$, $\phi = 0.03$
Instagram	Chi-square (1, $n = 132$) = 0.14, $p = 0.71$, $\phi = 0.05$
YouTube	Chi-square (1, $n = 132$) = 0.05, $p = 0.83$, $\phi = 0.05$
Pinterest	Chi-square (1, $n = 132$) = 0.19, $p = 0.66$, $\phi = -0.09$
RSS	Chi-square (1, $n = 132$) = 0.00, $p = 1.00$, $\phi = -0.04$
Vimeo	Chi-square (1, $n = 132$) = 0.00, $p = 1.00$, $\phi = -0.06$

From the data provided in Table 1, there is no difference between males and females in terms of the type of SM used to promote entrepreneurial projects

4.3. Objective 3: Are There Statistically Significant Differences Between Men and Women in the Observance of Digital Rights in the SM?

A total of 2195 rights were found in the SM of the entrepreneurs. In the three groups of rights, the observance mean of these is similar for male and female entrepreneurs (EPDR: males 2.8 rights, females 2.7 rights; FDR: males 2.7 rights, females 2.4 rights; DCSDR, males 1.6 rights, females 1.5 rights). However, in the FDR—that is, rights related to digital freedom—is where the greatest difference in observance is observed between the genders. Taking into account the three typologies of digital rights analyzed, it can be assumed that the groups EPDR—rights related to equality and participation—and FDR—freedom rights—are more used by both men and women. Specifically, the digital rights of equality and participation (EPDR) concern issues of accessibility, attention to diverse cultures, protection of minors, participation, truthful information, conditions of use, legal and ethical standards, digital transformation, training and support. In these rights, a similar proportion of male and female observance has been found:

- In rank 1 (low level of observance of rights), 15.5% of men, women 17.6%
- In rank 2 (medium level of observance), 48.2% of men, women 50%
- In rank 3 (high level of observance), 36.4% of men, women 32.4%.

In all three ranks it is observed that males and females protect the digital rights of equality and participation in a similar way in their SM. These results are also supported by the Chi-Square test (Table 2).

A Chi-Square test for independence (with Yates Continuity Correction and Fisher's Exact Test) indicated no significant association between gender and Equality and Participation Digital Rights except for the item 'The project is promoted by professional training plans (teachers, professionals, families, etc.) oriented towards digital transformation'. The phi coefficient value in this item is 0.25, which is considered a very small effect using Cohen's (1988) criteria.

The Freedom Digital Rights (FDR) are those related to privacy, image, digital identity, digital security, data protection, and rectification. They have been found in the various SM in the following ranges:

- In rank 1, 28.2% of men, women 35.3%;
- In rank 2, 21.8% of men, women 20.6%;

- In rank 3, 50% of men, women 44.1%.

Table 2. Percentage and Chi-Square test by gender for Equality and Participation Digital Rights.

Item	Men (%)	Women (%)	Chi-Square	Significantly Different
2.1. The project ensures access for all users of the social media (website, blog, Facebook, Instagram, WhatsApp ...):				
2.1.1.	76.4	73.5	Chi-Square (1, $n = 144$) = 0.01, $p = 0.82$, $\phi = -0.03$	Not
2.1.2.	21.8	26.5	Chi-Square (1, $n = 144$) = 0.11, $p = 0.64$, $\phi = 0.05$	Not
2.2. The project, in its social media (website, blog, Facebook, Instagram, WhatsApp ...):				
2.2.1.	31.8	29.4	Chi-Square (1, $n = 144$) = 0.00, $p = 0.84$, $\phi = -0.02$	Not
2.2.2.	40.9	47.1	Chi-Square (1, $n = 144$) = 0.19, $p = 0.56$, $\phi = 0.05$	Not
2.2.3.	81.8	79.4	Chi-Square (1, $n = 144$) = 0.00, $p = 0.80$, $\phi = -0.03$	Not
2.2.4.	87.3	85.3	Chi-Square (1, $n = 144$) = 0.00, $p = 0.77$, $\phi = -0.03$	Not
2.2.5.	65.5	61.8	Chi-Square (1, $n = 144$) = 0.04, $p = 0.68$, $\phi = -0.03$	Not
2.2.6.	64.5	55.9	Chi-Square (1, $n = 144$) = 0.50, $p = 0.42$, $\phi = -0.08$	Not
2.2.7.	60	64.7	Chi-Square (1, $n = 144$) = 0.09, $p = 0.69$, $\phi = 0.04$	Not
2.2.8.	79.1	52.9	Chi-Square (1, $n = 144$) = 7.71, $p = 0.00$, $\phi = -0.25$	Yes
2.2.9.	7.3	5.9	Chi-Square (1, $n = 144$) = 0.00, $p = 1.00$, $\phi = -0.02$	Not

On the basis of the percentages observed, in general, both men and women have a high level of regard for this type of rights in their SM. These results are also supported by the Chi-Square test (Table 3).

Table 3. Percentage and Chi-Square test by gender for Freedom Digital Rights.

Item	Men (%)	Women (%)	Chi-Square	Significantly Different
3.1. The project, in its social media (website, blog, Facebook, Instagram, WhatsApp ...):				
3.1.1.	60.9	58.8	Chi-Square (1, $n = 144$) = 0.00, $p = 0.84$, $\phi = -0.02$	Not
3.1.2.	61.8	61.8	Chi-Square (1, $n = 144$) = 0.00, $p = 1.00$, $\phi = -0.00$	Not
3.1.3.	68.2	52.9	Chi-Square (1, $n = 144$) = 2.01, $p = 0.15$, $\phi = -0.14$	Not
3.1.4.	53.6	50	Chi-Square (1, $n = 144$) = 0.03, $p = 0.84$, $\phi = -0.03$	Not
3.1.5.	69.1	64.7	Chi-Square (1, $n = 144$) = 0.23, $p = 0.67$, $\phi = -0.04$	Not
3.1.6.	60	58.8	Chi-Square (1, $n = 144$) = 0.00, $p = 1.00$, $\phi = -0.01$	Not
3.1.7.	70	58.8	Chi-Square (1, $n = 144$) = 1.01, $p = 0.29$, $\phi = -0.10$	Not
3.1.8.	65.5	52.9	Chi-Square (1, $n = 144$) = 1.24, $p = 0.22$, $\phi = -0.11$	Not
3.1.9.	15.5	14.7	Chi-Square (1, $n = 144$) = 0.00, $p = 1.00$, $\phi = -0.01$	Not
3.1.10.	60.9	55.9	Chi-Square (1, $n = 144$) = 0.10, $p = 0.69$, $\phi = -0.04$	Not

From what can be observed in Table 3, the column of Chi-Square test for independence (with Yates Continuity Correction and Fisher's Exact Test) indicated no significant association between gender and Freedom Digital Rights. Therefore, we can conclude that there are no statistically significant differences between genders in relation to Freedom Digital Rights.

Development, Creation and Sustainability Digital Rights (DCSDRs) refer to authorship, reproduction and dissemination, sustainability, social development and reusable data. They can be viewed as having been found in the various forms of SM:

- In rank 1, 41.8% of men, women 47.1%;
- In rank 2, 58.2% of men, women 52.9%;
- No cases have been found in rank 3, neither in males nor in females.

According to the percentages found, overall, males and females have a from low to medium rank of observance of the rights to development, creation and sustainability. This is also supported by the Chi-Square test (Table 4).

Table 4. Percentage and Chi-Square test by gender for Development, Creation and Sustainability Digital Rights.

Item	Men (%)	Women (%)	Chi-Square	Significantly Different
4.1. The project, in its social media (website, blog, Facebook, Instagram, WhatsApp . . .) guarantees:				
4.1.1.	60	61.8	Chi-Square (1, $n = 144$) = 0.03, $p = 1$, $\phi = 0.01$	Not
4.1.2.	46.4	41.2	Chi-Square (1, $n = 144$) = 0.11, $p = 0.69$, $\phi = -0.04$	Not
4.1.3.	60.9	52.9	Chi-Square (1, $n = 144$) = 0.39, $p = 0.43$, $\phi = -0.06$	Not
4.1.4.	82.7	76.5	Chi-Square (1, $n = 144$) = 0.32, $p = 0.45$, $\phi = -0.07$	Not
4.2. The project, in its social media (website, blog, Facebook, Instagram, WhatsApp . . .):				
4.2.1.	7.3	11.8	Chi-Square (1, $n = 144$) = 0.22, $p = 0.48$, $\phi = 0.07$	Not
4.2.2.	89.9	91.2	Chi-Square (1, $n = 144$) = 0.00, $p = 1.00$, $\phi = -0.02$	Not

A Chi-Square test for independence (with Yates Continuity Correction and Fisher's Exact Test) indicated no significant association between gender and Development, Creation and Sustainability Digital Rights

Although the strength of the association between gender and the different digital rights was weak in almost all the cases analyzed (except in item 228, which is promoted by professional training plans), a stronger relationship between gender and digital rights can be observed through the effect sizes (ϕ value) in items 313 (security), $\phi = -0.14$) and 318 (rights of access, rectification, deletion, $\phi = -0.11$). A weak discordance is observed, i.e., a slightly negatively trending relationship between gender and digital rights is observed in the DMs of young entrepreneurs. Lower values, i.e., no or almost no association between gender and rights, in 312 (digital identity, protecting the online reputation, $\phi = 0.00$) and 411 (authorship, $\phi = 0.01$). In this case, a concordance, albeit weak, can be observed between gender and digital rights. On the other hand, no relationship can be established between the positive and negative ϕ values with the various sections of rights analyzed.

5. Discussion and Conclusions

This research focuses on the analysis of initiatives of young entrepreneurs, the use of social networks and the observation of digital rights with the inclusion of the gender perspective. From the point of view of intersectionality (Crenshaw, 1989), it shows that other factors interrelate in gender discrimination, in this case, age, generating new barriers. Gender and age are also related and influence the use of and access to ICTs, giving rise to the so-called digital divide (Acosta-Velázquez & Pedraza-Amador, 2020) and a lack of knowledge about regulations and applications of digital rights (Barbosa et al., 2024). Key issues for research given their importance for solving the problem of youth and female unemployment (Bignotti & Le Roux, 2018; Stough, 2016) and the importance of women

and female entrepreneurship in both social and economic development in many countries (Hamdani et al., 2023).

Youth entrepreneurship and gender and ICT, internet and social media use and gender are issues that, although relevant, as Aljuwaiber (2021) and Gawel and Minska-Struzik (2023) point out, have not been studied in a related way. Furthermore, given the relevance of the use of SM in the projection of these initiatives (Naudin & Patel, 2017), the use and enforcement of digital rights were explored based on the need to protect users, as indicated by the European Commission (2023) in the Declaration on Digital Rights and Principles.

The existence of a gender gap in youth entrepreneurship is evident in this research despite the efforts that the United Nations, the European Commission and governments, in this case, the government of the Andalusian community, are making to reduce it through their policies, organizations and programmes (Council of Employment, Training and Self-Employment, Junta de Andalucía et al., 2021; Colombo et al., 2019; United Nations, n.d.-b). Among the entrepreneurial initiatives analyzed, it is shown that young men start more businesses than young women in almost all age ranges (16–29 years, except in the 24–26 years age group) and economic activities. These data are consistent with those presented in the GEM 2021/2022 report (GEM, 2022), which shows that, globally, women are less entrepreneurial than men by a ratio of from two to five in terms of early-stage projects. It can be thought, as Ionescu-Somers and Shay (2022) expose, that the efforts made by the different governments are still insufficient. The most entrepreneurial period for men was between 2000 and 2009, while the most fruitful period for women was from 2010 to 2019. It can be concluded that the policies and programs developed at the European level to facilitate entrepreneurship have had an impact in the observed region, although there is still much work to be done to reduce the gender gap in entrepreneurship.

Young female entrepreneurs prefer activities such as manufacturing, health, hospitality, services, education and entertainment. There are also activities such as health and services where women outnumber men. According to the SEPE (2023), service-related activities concentrate the highest female unemployment rates at the national level in Spain. On the other hand, young men are particularly prominent in activities such as manufacturing, agriculture and fishing, professional, scientific and technical activities, information and communication, and construction. In particular, we have found economic activities—such as financial and insurance, households, information and construction—where there are only male entrepreneurial initiatives. The only sectors in which the number of entrepreneurial initiatives is slightly higher for women are health/social services, manufacturing and other services. These data are again consistent with the data presented in the GEM 2021/2022 (2022) report and reveal that women continue to start up in sectors considered ‘feminized’ and men in more ‘masculinized’ sectors. There are traditionally male sectors, such as construction, where the lack of female entrepreneurship can be explained by social characteristics and perceptions in the assignment of gender roles to work. However, in traditionally female sectors, such as household activities, it cannot be explained by this reason. Rather, it could be thought that entrepreneurship remains an eminently male activity or that economic activities carried out in the household may not be recorded in the labor registers.

The entrepreneurs in the initiatives analyzed, regardless of their gender, use SM to give visibility to their projects and reach other markets, including international ones. These aspects were highlighted in the research of both Naudin and Patel (2017) and Secundo et al. (2020). Most of them, according to this study, prefer websites to social networks, and, as for the latter, they mostly use Facebook, as compared to others, such as Twitter, Instagram or YouTube. Concerning the use of SM by women, this study supports the findings of Manolova et al. (2020) and Steel (2021), who report the same level of use of

these technologies to disseminate projects and products. However, in the Raman et al. (2022) study, the results are the opposite, indicating that women do not use technology in the development of their entrepreneurial projects. In the present study, no statistically significant differences were found in most cases; however, it can be considered that, the smaller the effect size, the smaller the differences between the means of men and women. Therefore, in the cases analyzed, there is no evidence of a digital divide in access to and use of FS in terms of gender. However, in Raman et al. (2022), the results are the opposite, indicating that women do not use technology in the development of their entrepreneurial projects. These authors' aspects support the influence that gender has on the so-called digital divide (Acosta-Velázquez & Pedraza-Amador, 2020).

With regard to the protection of digital rights recommended by the European Commission (2023) and the Government of Spain (2021), in order to offer security to customers who use these SM, it should be noted that young entrepreneurs of both sexes apply them in their SM and there are no significant differences in terms of their use. While it is true that equality and participation rights (EPDRs) and freedom rights (FDRs) are the most protected in their SM, it should be noted that this is not the case for development, creation and sustainability rights (DCSDRs), related to key rights such as authorship, data management, participation and sustainability (Gallego-Arrufat et al., 2023). The absence of these rights in their SMs may be connected to Barbosa et al.'s (2024) assertion that most young entrepreneurs are unaware, or have insufficient knowledge, of regulations, applications and, consequently, the serious risks of non-compliance. In the words of Oppong et al. (2020), it could be said that this evidence adds new challenges to the use of social media by young entrepreneurs when it comes to using it as a way to make their entrepreneurial projects visible and market them.

In terms of limitations, it should be pointed out that this research has been used as a basis for the entrepreneurial projects that have been managed and accompanied for their start-up by the Andalusian regional administration. This is a limitation as not all entrepreneurs request support and follow-up from this administration, which limits the generation of results beyond young Andalusian entrepreneurs. Another limitation is related to the failure to incorporate qualitative analysis in order to be able to analyze in depth the reasons for a bias related to lower female entrepreneurship.

The results obtained in this research and its limitations open the door to a series of implications such as (a) the need for greater knowledge of why women, despite the support of European, national and regional policies, organisations and programmes, are less entrepreneurial, especially in the so-called masculinising sectors; (b) the desirability of greater gender awareness in relation to entrepreneurship and these sectors; (c) the recognition of the needs and difficulties faced by young women in launching and developing their entrepreneurial initiatives and their visibility through the new information and communication technologies, studying the role of the digital divide and its impact on the application of digital rights and principles; (d) the fact of having found, although without statistically significant differences, negative—the majority—and positive effect size (*phi*) values, as well as the absence of a relationship between gender and digital rights in the *phi* values, may open up new avenues for research, especially in the section related to Digital Freedom Rights, and (e) the development and implementation of training initiatives that promote knowledge and application of existing regulations on digital rights and principles and their risks.

In terms of future perspectives, the researchers consider that it would be important to detect the needs and difficulties of young women to become entrepreneurs and to observe the reasons why some bands of digital rights are more protected than others in

order to, on this basis, review European, national and regional policies and programs on entrepreneurship and the responsible use of SM and new information technologies.

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Article

Measuring the Nexus Between Information Literacy, Creativity, and Lifelong Learning in Media Professionals

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Abstract: Information literacy (IL) plays an essential role in digital inclusion as it enables people to make use of the information available in multiple mediums on the Internet through digital devices. This study intends to examine the effect of IL on lifelong learning (LL) through the mediating role of creativity among news reporters in Pakistan using a quantitative research approach. The survey was conducted using an online questionnaire from the registered news reporters of press clubs in the four provinces and the federal territory of Islamabad, Pakistan. A total of 758 responses were received and analyzed using PLS-SEM. The results indicated that the IL of news reporters positively influenced their lifelong learning through both direct and indirect pathways. Furthermore, the nexus between IL and LL was influenced by the mediation of creativity. These findings have practical implications for academia and the media industry, highlighting the invaluable role of IL in enhancing lifelong learning and creativity to attain a sustainable competitive advantage. These results may inform educational programs for journalism students and existing journalists to impart IL skills. This research contributes to the available literature on workplace IL, especially in the context of media professionals.

Keywords: information literacy; workplace; creativity; lifelong learning; news reporters; journalists; Pakistan

1. Introduction

In the ever-changing digital information landscape, the role of the journalist has become more complex, multifaceted, and demanding (Naveed and Saadia 2024). The emergence and proliferation of digital media platforms has fundamentally transformed the way news is produced, consumed, and disseminated. Therefore, journalists have to navigate a landscape where the ability to critically evaluate, utilize, and disseminate digital information is paramount (Boss et al. 2022; MacMillan 2014). Information literacy (IL) refers to meta-literacy (Pelser and Swanepoel 2022), enabling reporters to recognize their information requirements and adeptly find, access, assess, and utilize necessary information in an ethical and legal way (ACRL 2000). It plays a pivotal role in empowering individuals, journalists, and communities to navigate the increasingly complex digital landscape. The CILIP (2018) extended its scope by defining it as “the ability to think critically and make balanced judgements about any information we find and use”. Furthermore, it enables reporters to engage in effective utilization of ICTs to address their information requirements, developing informed perspectives and active participation in various societal realms (e.g., the workplace, health, education, citizenship, and everyday life). In an era where access to

information is no longer a luxury but a necessity, developing IL skills in reporters becomes imperative for fostering inclusive participation in the digital realm (Naveed and Kamran 2022). IL bridges the divide between individuals who simply have access to technology and those who can effectively harness its full potential. It also serves a powerful tool to combat misinformation and disinformation, thereby promoting digital equity and inclusion. In essence, IL is not merely a technical skill; it is a fundamental right and a cornerstone for achieving true digital inclusion (Lukianova and Ovcharuk 2024).

Information literacy empowers journalists through sharpening their critical thinking skills, enhancing their investigative abilities, and opening up new avenues for creative storytelling by leveraging diverse multimedia platforms (Saadia and Naveed 2024). In addition, it empowers journalists to navigate the digital landscape with confidence, fostering a culture of lifelong learning (LL) and promoting media literacy within their communities (Naveed and Saadia 2024). Ultimately, information literacy provides foundation for digital inclusion among Pakistani journalists, enabling them to harness the full potential of digital technologies for effective storytelling, audience engagement, and professional development (MacMillan 2014; Mansoor 2024).

In the organizational context, the recognition of IL in journalists as a vital set of skills, enabling the workforce for an effective utilization of information assets to attain a sustainable competitive advantage (Naveed and Rafique 2018; Ottonicar et al. 2020; Sasikala and Kumari 2013) and generate responsible journalism value (Forster (2017)), is crucial. Existing research has demonstrated the critical role of IL in informing reporters on environmental scanning, decision-making, and innovative reporting (Ahmad et al. 2020; Naveed 2022; Zhang et al. 2010). The creation of value through IL is totally dependent on how much the workforce in the field of journalism is digitally inclusive and its performance in situation analysis, information management, research and development, and information follow-up (C. S. Bruce 1999). IL enables workers in the news industry to adopt appropriate information behavior and effectively utilize information in decision-making and making balanced judgments about market trends (Inayatillah 2018; Naveed and Shah 2023; Suorsa et al. 2021). In conclusion, the news industry needs to be information-literate to identify market needs, generate business value, and achieve competitiveness (Wu 2018).

The pursuit of the workforce in the field of journalism in learning new competencies and knowledge is a form of lifelong learning (Coşkun and Demirel 2010), which is critical for creating positive attitudes and habits in acquiring new knowledge and applying it for organizational development in the news industry (Plaza and Robotham 2021). On the other hand, creativity refers to the generation of original, novel, distinctive, and invaluable ideas to achieve sustained growth and competitiveness (Leone 2020). Hence, creative and lifelong learners are crucial to achieve organizational performance and effectiveness (Kark et al. 2018; Kirkwood 2021). Interestingly, both LL and creativity undertake specific information activities and rely heavily on the adoption of the suitable information behavior in the workplace. Some inquiries have reported the capabilities of IL to enhance LL outcomes and creativity (Chang and Hsu 2015; Feng and Jih-Lian 2016; Naveed et al. 2023; Wu 2018). From a theorization viewpoint, clear and substantial empirical evidence is needed on how IL influences LL through creativity among reporters. Therefore, understanding the interrelationships between IL, LL, and creativity warrants further enquiry.

Building on the preceding argument, the present study aimed to empirically examine the interrelationships between IL, LL, and creativity among news reporters in Pakistan. News reporters were selected as a unit of analysis due the diverse, research-intensive, and time-sensitive nature of their work, coupled with their involvement in the business of information (Anwar and Asghar 2016). Their role requires them to concurrently acquire, search for, consume, generate, and disseminate information. Consequently, news reporters must adopt suitable information behavior to craft credible news stories and prevent misinformation (Haider et al. 2022). Moreover, there is a lack of research investigating IL in the journalists' workplace globally (Haider et al. 2022; Naveed et al. 2023; Naveed and Saadia 2024). Understanding the connections between IL, LL, and creativity among news reporters

would assist media houses in recognizing IL's efficacy in the workplace. Practically, this research has the ability to inform concrete actions that can enhance the effectiveness and adaptability of Pakistani journalists in the digital age. By emphasizing the pivotal role of IL in fostering digital inclusion, the findings of this research provide media organizations with a roadmap for investing in training programs that equip journalists with essential skills for confident navigation in the digital information landscape. Moreover, educational institutions can leverage these insights to refine journalism curricula, ensuring that graduates are equipped with the knowledge and competencies necessary for success in today's media environment. Ultimately, policymakers can utilize this study's findings to advocate for policies and initiatives that promote media literacy and digital access, thereby fostering a more informed and engaged citizenry. Overall, this study serves as a practical guide for stakeholders across the journalism ecosystem to collaborate in building a more resilient and inclusive media industry in Pakistan.

The research objectives specifically addressed in this study are as follows:

Research Objectives (RQs):

1. To explore how IL affects lifelong learning among media professionals;
2. To analyze the influence of IL on creativity;
3. To assess the effect of creativity on lifelong learning;
4. To evaluate the mediation of creativity in the relationship between IL and lifelong learning.

2. Research Review and Hypothesis Formulation

2.1. Workplace Information Literacy (WIL)

There has been a phenomenal increase in WIL research since the realization of information as a driving force for generating business value in the media industry (Ahmad et al. 2020; Forster 2017; Naveed and Shah 2023; Naveed et al. 2023). The exponential growth of information available through multiple formats called for information-literate and learned reporters to achieve a sustainable competitive advantage and innovation (C. Bruce 2003; Kirk 2004; Saadia and Naveed 2022). Solmaz (2017) considered IL as paramount for informed learning, enabling collaborative information use in the socio-technical system of the news industry. Furthermore, Ahmad et al. (2020) discovered that journalists in the sphere of the Internet and web development perceived IL as a way of staying informed, solving problems, developing websites, and engaging with learning communities. Malafi et al. (2017) reported that IL improves operational efficiency, informs decision-making, saves time, increases profit, and improves customer service, motivation, and information governance. A research study by Ahmad et al. (2020) reported IL as a positive predictor of organizational innovation using the responses of 184 CEOs from varied enterprises. Haider et al. (2022) discovered IL's positive influence on practices of personal information management among electronic media reporters. A review of WIL research published from the South-Asian region by Saadia and Naveed (2022) revealed a lack of related studies in the media industry.

2.2. Information Literacy and Lifelong Learning

IL lays the groundwork for reporters' lifelong learning as it refers to the skill set related to information capabilities, and lifelong learning is a good habit (Horton 2006). Furthermore, Horton (2006) argued that these constructs appeared to have a strategical and reinforcing interrelationship and are largely self-motivated, self-empowering, self-directed, and self-actuating for professional development. Although the relation between these two constructs has been under debate since the beginning of the 21st century (Gardner 2000; Isfandyari-Moghaddam and Kashi-Nahanji 2011), few studies have provided empirical evidence in the media industry. IL capabilities overcome barriers and improve the lifelong learning process (Coşkun and Demirel 2010; Kozikoglu and Onur 2019; Solmaz 2017). Recent research by Naveed et al. (2023) also discovered that the IL of journalists positively influences their LL. In view of this argument, it is inferred that IL capabilities positively influence LL in varied

workplace contexts. No research is available examining the connection between these two constructs using news reporters as unit of analysis despite their primary engagement with the information business. Thus, the first hypothesis was developed as given below:

Hypothesis 1 (H₁). *IL positively affects LL.*

2.3. Information Literacy and Creativity

The process of creativity undertakes certain information-related tasks and is dependent on how effectively people need, seek, and make use of credible information in the media industry (Chang and Hsu 2015; Wu 2018). Therefore, creativity requires reporters to possess competencies for efficient and effective recognition of their information requirements and seeking (Jaussi and Randel 2014). Building on the preceding discussion, it is quite logical to draw an inference that IL positively influences creativity skills. Empirical evidence from some workplace studies also supports this inference (e.g., Bagheri and Baviran 2022; Chang and Hsu 2015; Ghazizadeh et al. 2017; Naveed et al. 2023; Wu 2018). However, this empirical evidence must be further corroborated in media industry contexts for the purpose of theorization. Therefore, the interrelationship between IL and creativity among reporters justifies further discovery. Thus, the following hypothesis was proposed:

Hypothesis 2 (H₂). *IL positively affects creativity.*

2.4. Creativity and Lifelong Learning

The production of new, valuable, and distinctive ideas (Kaufman 2018) is the result of creativity. The relationship between creativity and LL also appears to be strategic and reinforcing. Both creativity and LL are transversal skills that contribute to the development of each other (Lucas and Venckutė 2020; Su 2009). Media studies institutions also require the integration of creativity into the curriculum so that a creative and lifelong learner may be produced (Arp and Woodard 2004). Although the positive relationship between creativity and LL is debated in the existing literature, there is a lack of substantial empirical evidence for this inference in the media industry. Furthermore, no such research examining the interrelationship between creativity and LL skills in news reporters has been found as of yet, which also warrants further examination. Hence, the third hypothesis was posited as follows:

Hypothesis 3 (H₃). *Creativity positively influences LL.*

2.5. Information Literacy and Lifelong Learning: Mediation of Creativity

IL establishes a basis for both LL and creativity as they rely heavily on information activities and the adoption of suitable information behavior to be successful in the media industry (Naveed et al. 2023). Empirical evidence suggests that IL skills enhance LL (Feng and Jih-Lian 2016; Kozikoglu and Onur 2019) and creativity (Chang and Hsu 2015; Naveed et al. 2023; Wu 2018). On the other hand, creativity is a transversal skill contributing to the development of LL (Lucas and Venckutė 2020; Su 2009) and needs to be integrated into education and LL (Arp and Woodard 2004). The interrelationship between creativity and LL among reporters lacks empirical evidence. Given the three-way association between these constructs, it is predicted that creativity has a mediating role in the relationship between IL and LL. Moreover, no research exists so far examining the mediating role of creativity in the connection between IL and LL. Thus, the fourth hypothesis is stated as given below:

Hypothesis 4 (H₄). *Creativity mediates the relationship between IL and LL.*

3. Research Design and Methods

3.1. Research Model

This study aimed to explore the interrelationships of IL, LL, and creativity among news reporters as given in the research model explaining the hypothesized connections among these research constructs (Figure 1).

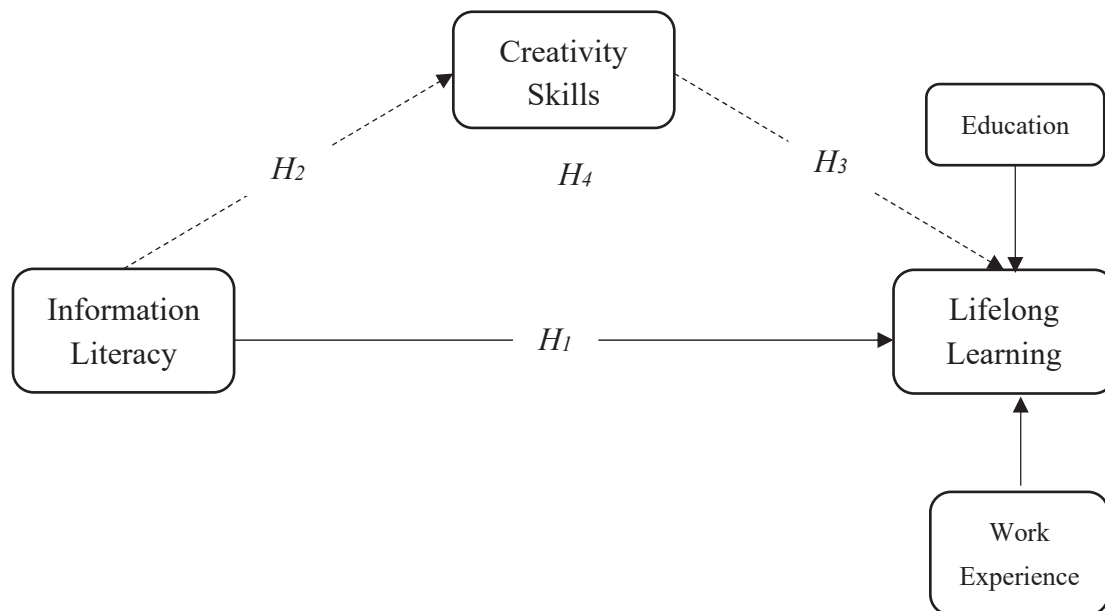


Figure 1. Hypothetical research model.

3.2. Design and Method

This research employed a quantitative research design along with a survey method to conduct the proposed investigation. A structured questionnaire was deployed for data collection from news reporters. The structured questionnaire contained a total of 37 statements associated with IL (19 items), LL (8 items), and creativity (10 items). All of these statements were measured on a five-point Likert-type scale ranging from strongly agree to strongly disagree (e.g., 5 = strongly agree; 4 = agree; 3 = neither agree nor disagree; 2 = disagree; and 1 = strongly disagree). Questions on demographic variables such as age, sex, work medium, education, work experience, and region were also asked.

3.3. Measurement Instruments

3.3.1. Information Literacy

The perceptions of these news reporters related to IL were assessed using items generated based on standards of IL developed by ACRL for journalists in 2012. Examples of such statements include “I can identify what type of information sources can fulfill my information need”, and “I can derive main ideas and facts from information sources to create stories”. The internal reliability analysis, such as the Cronbach alpha (CA) and composite reliability (CR) for the IL measure, indicated higher values, that is, CA = 0.938 and CR = 0.944, respectively. This indicated that the measure used in this study had higher internal consistency, as the value of CA was closer to one (Mathews et al. 2019). The CR value was marginally higher than that of CA since CR is considered an alternative to CA (Naveed et al. 2023). CA has faced criticism for its lower bound value, which may underestimate true reliability, while CR provides a marginally higher value. However, this difference is generally minor and holds limited practical significance (Naveed et al. 2023; Peterson and Kim 2013).

3.3.2. Creativity

The items related to creativity skills were chosen from the creativity scale developed by Muñoz-Doyague et al. (2008) for the measurement of the creativity of these news reporters. There were 10 statements associated with creativity skills. The instances of such statements include “I suggest new and better ways to achieve goal or objectives”, and “I develop ideas, methods or processes that are both original and especially useful to the organization”. The measures also show higher internal consistency for this measure as there were high values for CA = 0.894 and CR = 0.913 based on the data set of this study.

3.3.3. Lifelong Learning

There were eight statement related to lifelong learning developed by Gardiner and Kline (2007). Instances of such statements include “I have a passion for learning”, and “I learn because to achieve my career goals”. This measure was also internally consistent and acceptable, with the values of CA = 0.868 and CR = 0.897 (Naveed et al. 2023; Peterson and Kim 2013).

3.3.4. Population and Sampling

All the news reporters who were registered with the press clubs in each of the four provinces (e.g., Baluchistan, Khyber Pakhtunkhwa Sindh, and Punjab) and Islamabad (federal capital) were considered as the population of the proposed research. The sample size was 371, calculated based on the 95% confidence interval and 5% margin of error.

3.3.5. Data Collection and Analysis

The registered news reporters in each press club were approached using a link, containing the questionnaire and covering letter, created in Google Forms for data collection with written permission from their respective administration. The link was shared through the administration of each press club in their listed servers and WhatsApp groups. The news reporters were asked for their voluntary participation in the survey. These news reporters were also ensured about the privacy and anonymity of their data. Three follow-up reminders were also sent to the news reporters to increase the response rate. The researchers received a total of 758 survey responses from the news reporters in approximately two–three months. The received responses were carefully screened for data completeness and accuracy prior to data analysis.

The connections, both direct and indirect, between IL, LL, and creativity were measured through calculating PLS-SEM in SmartPLS version 3.3.3. First of all, the reliability and validity of the reflective measures used in this research were analyzed through measurement modeling. Afterwards, SEM (structural equation modeling) was performed for measurement of the direct and indirect relations between IL, LL, and creativity.

4. Results

4.1. Demographic Characteristics

Of the 758 respondents, about half of these news reporters ($n = 387$, 51.05%) belonged to the age group of 25–35 years, followed by those who were in the age bracket of 36–45 years ($n = 149$, 19.66%). There were 131 (17.28%) participants aged more than 45 years. Only 91 (12.01%) participants were aged up to 25 years. There were 441 (58.18%) males and 317 (42.82%) females. About two-thirds of these news reporters ($n = 499$, 65.83%) were associated with electronic media, whereas the rest of these news reporters belonged to print media ($n = 259$, 34.17%). Concerning their educational levels, a little more than two-thirds of these news reporters were graduates ($n = 491$, 64.77%). This was followed by those having postgraduate ($n = 151$, 19.92%) and undergraduate ($n = 116$, 16.31%) levels of education. Moreover, most of these news reporters had 11–15 years of work experience ($n = 321$, 42.34%), followed by those who had work experience between 6 and 10 years ($n = 217$, 28.63%) and 15+ years ($n = 121$, 15.96%). There were only 99 (13.06%) participants who had up to five years of work experience. More than one-third of these news reporters

belonged to Lahore (n = 271, 35.75%), Islamabad (n = 258, 34.03%), and Karachi (n = 191, 25.20%). Only 21 (2.77%) and 17 (2.24%) survey participants belonged to Peshawar and Quetta, respectively as shown in Table 1.

Table 1. Demographic characteristics the survey respondents (N = 758).

Characteristics	Categories	Frequency (n)	Percentage (%)
Age (Years)	Up to 25	91	12.01
	25–35	387	51.05
	36–45	149	19.66
	45+	131	17.28
Sex	Male	441	58.18
	Female	317	42.82
Medium	Electronic	499	65.83
	Print	259	34.17
Education	Undergraduate	116	16.31
	Graduate	491	64.77
	Postgraduate	151	19.92
Work Experience (Years)	Up to 5	99	13.06
	6–10	217	28.63
	11–15	321	42.34
	15+	121	15.96
Region	Lahore	271	35.75
	Karachi	191	25.20
	Peshawar	21	2.77
	Quetta	17	2.24
	Islamabad	258	34.03

4.2. The Measurement Model

This study aimed to examine the interrelationships between IL, LL, and creativity among the news reporters using partial least square structural equation modeling (PLS-SEM). PLS-SEM was useful in this research due to three reasons. First, it helped us to find the complex cause–effect and mediating relations among constructs. Second, it helped us to develop theories from a small data set. Third, it provided a robust model efficiency (286) in terms of outer model testing and inner model testing. Prior to examining the connections among these constructs, the reliability and validity of measures were meticulously verified by applying measurement model analysis in SmartPLS (version 3.3.9). Table 2 indicates the reliability and validity of the measures used in this research. Factor loading, Cronbach’s alpha, rho_A, and composite reliability were used as the reliability indicators. The loading strength of each factor was 0.62 or above, which indicated the appropriateness of these items as the threshold value for factor loading is 0.60 (Hair et al. 2019). Likewise, the values for the Cronbach’s alpha, rho_A, and composite reliability indicators were 0.86 and above, which were also higher than the threshold value of 0.70 (Iqbal et al. 2021). These figures indicated that these measures met the reliability requirements. The convergent validity of these measures was ensured through the application of an average variance extracted (AVE). According to Sarstedt et al. (2017), the threshold value for AVE is 0.50. Table 2 indicates that the values of AVE for all these constructs were either equal to or higher than 0.50. Thus, these measures fulfilled the reliability and validity requirements for data collection (see also Figure 2).

The measurement of discriminant validity in PLS-SEM was performed through the heterotrait–monotrait (HTMT) approach as suggested by Henseler et al. (2014) because it is more appropriate than the approach recommended by Fornell and Larcker (1981) due to its unsuitability and unreliability for the measurement of discriminant validity (Henseler et al. 2014). The HTMT method is described as the correlation between items across

different constructs compared to the correlations among items within the same construct. The threshold value of HTMT for discriminant validity is less than 0.90 according to the criterion suggested by Henseler et al. (2014). Table 3 shows that these constructs met the criterion of discriminant validity.

Table 2. Reliability and validity analysis.

Scales	Factor Loading	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Information Literacy (IL)					
IL1	0.658				
IL2	0.693				
IL3	0.663				
IL4	0.715				
IL5	0.678				
IL6	0.730				
IL7	0.721				
IL8	0.668				
IL9	0.670	0.938	0.938	0.944	0.500
IL10	0.685				
IL11	0.713				
IL12	0.665				
IL13	0.670				
IL14	0.651				
IL15	0.697				
IL16	0.653				
IL17	0.726				
IL18	0.701				
IL19	0.687				
Creativity (C)					
C1	0.745				
C2	0.761				
C3	0.775				
C4	0.715				
C5	0.735	0.894	0.897	0.913	0.513
C6	0.709				
C7	0.692				
C8	0.62				
C9	0.681				
C10	0.72				
Lifelong Learning (LL)					
LL1	0.715				
LL2	0.731				
LL3	0.784				
LL4	0.676	0.868	0.869	0.897	0.521
LL5	0.684				
LL6	0.734				
LL7	0.736				
LL8	0.708				

Table 3. Discriminant validity.

Constructs	Creativity	Information Literacy	Lifelong Learning
Creativity (C)	0.716		
Information Literacy (IL)	0.688	0.687	
Lifelong Learning (LL)	0.68	0.691	0.722

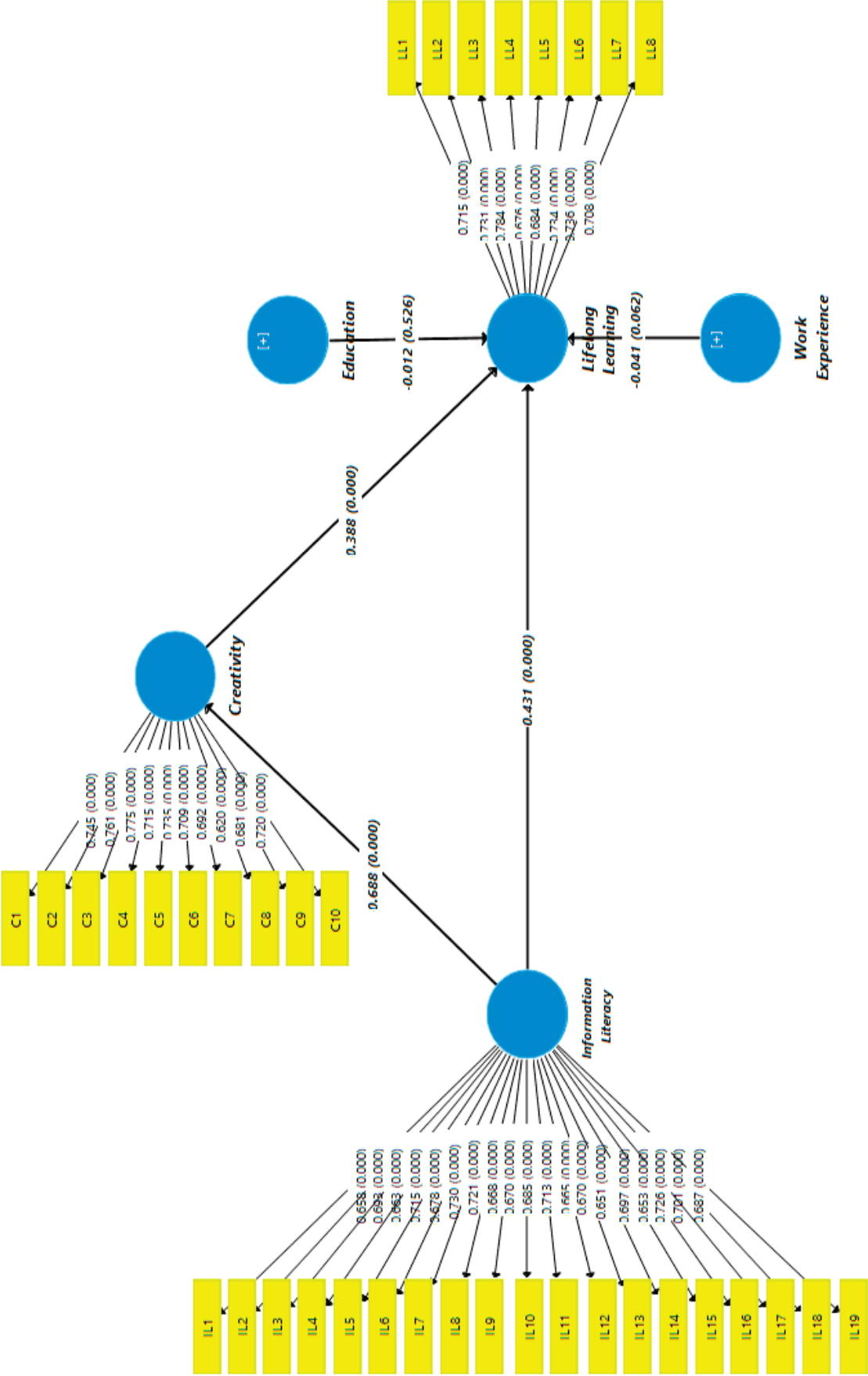


Figure 2. Research model.

The collinearity issue was resolved by applying the Variance Inflation Factor (VIF) technique during the PLS-SEM analysis. VIF threshold values less than 5 are acceptable, and VIF values less than 3 are considered ideal (Hair et al. 2013). The figures in Table 4 reveal that the range of VIF values among dimensions is 1.000 to 1.928, indicating no collinearity issues among the dimensions of IL, LL, and creativity.

Table 4. Collinearity and model fit.

Dimensions	C-VIF	LL-VIF	Model Fit	
Creativity (C)		1.928	SRMR	0.040
Information Literacy (IL)	1.000	1.923	NFI	0.87
			RMS_Theta	0.074

Three key model fit indices, SRMR, NFI, and RMS_theta, are commonly employed in PLS-SEM analysis to measure the overall fitness of a model. Table 4 also presents the details of the model fit indices. The value for SRMR, that is, 0.040, indicated that the proposed model had a good fit, as the threshold value for SRMR is less than 0.08. Likewise, the value of NFI is 0.87, which is also acceptable, indicating the better fit of the model, as the ideal threshold value for NFI is one, and NFI values closer to one are considered to show a better model fit. Furthermore, the RMS_theta index was utilized for reflective measurement modeling. The value of RMS_theta was 0.074, which also indicated the appropriateness of the model fit, as the threshold value for RMS_theta is less than 0.12. Thus, the figures in Table 4, in general, indicate that the proposed model appeared to have a good fit.

The model's explanatory capability was assessed using the R^2 value, which falls within the range of 0 to 1. A high R^2 value signifies a stronger explanatory power. Threshold values for the model, categorized as weak, moderate, and strong, are set at 0.25, 0.50, and 0.75, respectively. The latent variables creativity (R^2 value: 0.473) and LL (R^2 value: 0.558) demonstrate moderate levels of explanatory power (Table 5).

Table 5. R square and F square.

Variables	R Square	R Square Adjusted	F Square	
			Creativity	Lifelong Learning
Creativity (C)	0.473	0.471		0.177
Lifelong Learning (LL)	0.558	0.556		
Information Literacy (IL)			0.898	0.218

The influence of exogenous variables on endogenous variables can be identified using the f^2 approach, having threshold values as follows: small ($0.02 < f^2 \leq 0.15$), medium ($0.15 < f^2 \leq 0.35$), and large ($f^2 > 0.35$) effects. The explanatory effect (f^2 value) of IL on creativity is 0.898, indicating a significant impact, categorized as a larger effect. Similarly, the explanatory effect (f^2 value) of IL on LL is 0.218, signifying a medium effect. Additionally, the explanatory effect (f^2 value) of creativity on LL is 0.177, also denoting a medium effect.

4.3. Descriptive Analysis

The levels of IL, LL, and creativity were assessed by performing descriptive analysis within the surveyed sample (Table 6). All the measures were divided into five levels (1–5) from lowest to highest. The news reporters had higher levels of IL, LL, and creativity, with a mean score ranged between 4.214 and 4.414. These high mean scores reflected higher perceptions for each research variable.

Table 7 displays the relationships between the different factors studied. It shows that IL has a moderate positive correlation with LL ($r = 0.431$, $p < 0.01$) and strong positive correlation with creativity ($r = 0.688$, $p < 0.01$). Creativity also has a moderately positive

correlation with LL ($r = 0.388, p < 0.01$). However, there was weak correlation of education and work experience with LL ($r = -0.012, p = 0.526$ and $r = -0.041, p = 0.062$, respectively), indicating no significant relationship.

Table 6. Descriptive statistics.

Variables	N	Minimum	Maximum	Mean	SD
Information Literacy (IL)	758	1	5	4.414	0.572
Lifelong Learning (LL)	758	1	5	4.395	0.671
Creativity (C)	758	1	5	4.214	0.760

Table 7. Correlations among variables.

Variables	Correlation
IL and Lifelong Learning	0.431 **
IL and Creativity	0.688 **
Creativity and Lifelong Learning	0.388 **
Education and Lifelong Learning	−0.012
Work Experience and Lifelong Learning	−0.041

** $p < 0.01$.

4.4. Structural Model

This study employed the SmartPLS statistical software (version 3.3.3) to examine the connections between IL, LL, and creativity. SmartPLS is a variance-based structural equation modeling (SEM) approach that allows for the simultaneous evaluation of the measurement model. This method assesses the reliability, validity, and both structural and hypothesized relationships among the constructs utilized in the proposed research model. Direct and indirect effects of IL on LL are outlined in Table 8. The results indicated a positive influence of IL on LL ($\beta = 0.431, p < 0.05$), supporting research hypothesis H1. Similarly, IL positively and significantly affected creativity ($\beta = 0.688, p < 0.05$), confirming H2. In addition, creativity had a statistically significant positive effect on LL ($\beta = 0.388, p < 0.05$). Consequently, H3 was also validated (see also Figure 2).

Table 8. Direct and indirect relations.

Hypotheses	Direct Relations	Coefficients	Mean	SD	T	<i>p</i> Values	Decision
H1	IL -> Lifelong Learning	0.431	0.43	0.045	9.498	0.000	Accepted
H2	IL -> Creativity	0.688	0.69	0.021	33.084	0.000	Accepted
H3	Creativity -> Lifelong Learning	0.388	0.389	0.042	9.137	0.000	Accepted
Hypotheses	Indirect Relations	Coefficients	Mean	SD	t	<i>p</i> Values	Decision
H4	IL -> Creativity -> Lifelong Learning	0.267	0.268	0.029	9.259	0.000	Accepted
Control Variables	Education -> Lifelong Learning	−0.012	−0.012	0.019	0.635	0.526	Rejected
	Work Experience -> Lifelong Learning	−0.041	−0.041	0.022	1.863	0.062	Rejected

4.5. Mediating Effect

The indirect relation of IL with LL through the mediation of creativity was also examined in this research. The mediation of creativity in the relationship between IL and LL ($\beta = 0.144, p < 0.05$) was also supported (Table 7). Therefore, research hypothesis H4

was also accepted. Furthermore, the direct effects of two control variables, education and work experience, on LL were also measured ($\beta = -0.012, p < 0.05$, $\beta = -0.041, p < 0.05$). Both the control variables did not have any statistically significant influence on LL (see also Figure 2).

5. Discussion

This study examined how IL affects LL, with creativity as a mediator, among news reporters in Pakistan. The proposed research model was conceptualized on the basis of prior research studies and empirically validated by analyzing primary data gathered in the survey. A detailed examination of the descriptive analysis discovered that these news reporters had a higher level of IL, LL, and creativity skills, as they agreed with the statements and scored higher means ranging from 4.214 to 4.414 (Table 6). These results were expected and appeared logical as news reporters need sufficient capabilities for IL, LL, and creativity to perform well in the media industry and require continuous engagement with formal and informal learning, unlearning, and relearning in the journalists' workplace (Elmborg 2006; Ward 2006). These findings were consistent with those of Naveed et al. (2023), who also reported journalists as information-literate, creative, and lifelong learners. Additionally, the finding with regard to higher IL levels among news reporters also corroborated the results reported by Haider et al. (2022). Similarly, Naveed and Saadia (2024), in a recent research study, also reported journalists as being information-literate.

The data analysis revealed that IL affected LL directly and positively among news reporters (H1). These outcomes appeared anticipated and logical as the existing literature argued that IL lays foundations and has a strategic and reinforcing relationship with LL (Horton 2006). This finding corroborated the results of the existing studies reporting that IL is a positive predictor of LL (Kozikoglu and Onur 2019; Seifi et al. 2020). Similarly, the study of Feng and Jih-Lian (2016) also discovered a positive and statistically significant relationship of IL with LL among university teachers in Fujian Province, China. Likewise, an inquiry of 127 sports teacher candidates by Solmaz (2017) also reported IL as a positive and significant predictor of LL. A recent research study by Naveed et al. (2023) also shared a similar result that the LL skills of journalists increase as their IL skills increase. Thus, it is plausibly concluded that the modern enterprise in general and media houses in particular need to make arrangements to impart IL instruction in working environments.

A perusal of the results also indicated a direct but positive effect of IL on the creativity of news reporters (H2). This finding was estimated as the creativity process undertakes certain information practices, requiring individuals engaged in creativity to adopt adequate information behavior (Naveed et al. 2023). This finding also aligns with the results of previous studies reporting IL as a positive influencer of creativity (Mitchell et al. 2017; Wu 2018). Similarly, the results of Chang and Hsu (2015) also discovered a positive and significant relationship between these variables. Furthermore, some other studies from the context of the workplace also determined a positive association between IL and creativity (Bagheri and Baviran 2022; Chang and Hsu 2015; Ghazizadeh et al. 2017; Zhu et al. 2019). Likewise, a recent study by Naveed et al. (2023) also reported IL as a positive predictor of creativity among journalists. Thus, it is concluded that higher IL capabilities increase creativity in the workplace. Furthermore, the results also indicated a direct but positive influence of creativity on LL (H3). This result was also expected as creativity is a transversal skill contributing to the development of LL (Lucas and Venckutė 2020). This relationship was examined for the first time in this study and so requires further substantial empirical evidence from multiple contexts before the theorization that creativity influences LL positively can be achieved. In addition, creativity also appeared to mediate the nexus between IL and LL (H4). The mediation of creativity in the relationship between IL and LL was also examined for the first time in this study and which requires further investigation from a theorizing viewpoint. Hence, it is concluded that IL not only predicted LL directly but also had an indirect effect through the mediation of creativity.

6. Conclusions

The empirical testing of the hypothetical research model (Figure 1) was conceptualized based on the available research on IL, creativity, and LL. The research outcomes affirmed the nexus between IL, creativity, and LL in the workplace of news reporters. The conclusions drawn include the following: First, IL can confidently be linked with LL and creativity as it has a direct and positive effect on creativity and LL. Second, creativity can also be associated with LL as it also positively predicted LL. Lastly, IL also had an indirect but positive influence on LL through the mediation of creativity. The pragmatic insights generated by these results would be helpful for enterprises in general and media houses in particular in understanding the role of IL in LL and creativity in the context of the workplace, but also as the key to digital inclusion, and the way it may positively influence institutional performance and effectiveness in generating business value and achieving a sustainable competitive advantage through entrepreneurial ventures.

7. Implications

These results hold significant implications for training and development within the Pakistani journalism context, as well as for information specialists, academics, researchers, and practitioners. Firstly, media organizations should devise a human resource development strategy to prioritize identifying and addressing any IL deficiencies among their workforce, providing tailored education and training programs to enhance these skills. Secondly, existing local training programs for journalists must be revamped to integrate content related to information literacy, creativity, and LL, thereby ensuring the continuous capacity building of the industry's professionals. Thirdly, academic programs in media studies institutes of universities should consider incorporating information literacy as a standalone, credit-bearing mandatory course within their curriculum, preparing future journalists with the necessary skills to thrive in the digital media landscape. Lastly, information managers in special libraries should collaborate with institutional training teams to develop need-based IL instruction programs tailored to the specific context of their workplace, ensuring that journalists have access to the resources and support necessary for their ongoing professional development. By implementing these recommendations, stakeholders across the journalism ecosystem can work together to cultivate a more skilled, adaptable, and informed workforce, ultimately contributing to the advancement of the Pakistani media industry.

8. Limitation and Future Directions

There were certain limitations of this research. First, this research measured IL, creativity, and LL using a self-assessment method. Therefore, there is a possibility that the survey respondents overrated their skills rather than reporting their actual skills. Second, this research may be subject to sampling bias as the survey respondents were recruited through a non-probability convenience sampling process. As a result, despite the large sample size, the sample may not accurately represent the target population. Third, the research was conducted within the specific context of news reporters' workplaces, which could restrict the generalizability of the findings to other workplace settings and contexts. Therefore, substantial empirical evidence is needed from other contexts and workplaces in different cultural and geographical locales to strengthen these research results. As far as future research directions are concerned, the replication of this study can be conducted in other contexts and workplaces. Future inquiries can also examine the influence of information anxiety, the feeling of discomfort in the absence of IL, on LL through the mediation of creativity.

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Article

A System Dynamics-Based Interactive Learning Environment for Online Formative (Self-)Assessment of Wanna-Be Entrepreneurs' Performance Management Capabilities

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Abstract: Background: Many scholars emphasize the way in which sustained organizational development requires a shift in focus from the individual traits of the entrepreneur to the building of an organization that utilizes the collective contributions of its employees. To achieve this, entrepreneurs must adopt the role of a facilitator and empower their employees to perform at their best. There are numerous factors that influence one's decision to pursue a career in entrepreneurship, such as the beliefs and desires that individuals possess. Entrepreneurs possess diverse self-perceptions, and this plays a crucial role in their motivation to start a new business. Studies on entrepreneurial self-perception examine the elements, such as personal identity and capabilities—particularly the ability to effectively manage company drivers—which ultimately shape one's decision to embark on a new venture. Launching a startup is not merely an act; rather, it represents a substantial reflection of an individual's self-concept and identity. Consequently, an individual's perceived social identity has a substantial influence on their choice to pursue entrepreneurship, as they view the venture as an extension of themselves. Methods: An online interactive learning environment (ILE) designed to assess the performance management capabilities of wanna-be entrepreneurs, in accordance with the formative assessment paradigm, has been developed. Results: The procedures for carrying out the formative (self-) assessment of wanna-be entrepreneurs' performance management capabilities will be detailed. Two concrete assessment cases, with the aim of making clearer what kind of outcomes the ILE can generate, will be presented. Conclusions: The ILE could contribute in the encouragement of wanna-be entrepreneurs to participate in entrepreneurship educational programs.

Keywords: interactive learning environment; formative assessment; entrepreneurship; educational entrepreneurship; performance management capabilities

1. Introduction

Many scholars have emphasized the way in which sustained organizational development requires a shift in focus from the individual traits of the entrepreneur to the building of an organization that utilizes the collective contribution of its employees (Zahra and Garvis 2000). While having a strong entrepreneurial personality is crucial for the initial survival and success of a venture (Ceresia and Mendola 2019, 2020), entrepreneurs who can effectively engage and leverage the talents and skills of their workforce are more likely to achieve positive outcomes for the organization (Shepherd et al. 2015).

To achieve this, entrepreneurs must adopt the role of a facilitator and empower their employees to perform at their best. By creating an environment that promotes collaboration, innovation, and continuous learning, entrepreneurs can channel their entrepreneurial characteristics towards driving organizational growth and success and promoting and optimizing employees' performance. This entails fostering a positive work environment, establishing explicit goals and objectives, allocating resources and offering support to employees, and implementing efficient processes and systems. A skilled entrepreneur acts as a facilitator, empowering and motivating employees to reach their maximum potential

and ultimately bolstering the organization's overall performance. This approach aligns with the resolution of the ancient debate in the field of international entrepreneurship regarding whether individuals possess innate entrepreneurial traits or if their abilities, knowledge, and expertise are cultivated through education and practical experience. Scholars argue that education and training have a significant influence on entrepreneurial activity (Ceresia 2018). They propose that one can acquire the entrepreneurial role through cultural and experiential means, emphasizing the way in which entrepreneurship is not solely based on heritable skills, but is rather a discipline that can be learned (Gibb 1987; Lichtenstein and Lyons 2001; Shaw and Sørensen 2019). Therefore, specific education and training—entrepreneurship education (EE)—programs are decisive for the development of entrepreneurial abilities (Hahn et al. 2017; Nabi et al. 2017; Kuratko and Morris 2018; Bauman and Lucy 2019).

1.1. Entrepreneurial Skills, Competencies and Capabilities

The investigation of entrepreneurial skills is crucial in today's rapidly evolving business environment. As economies and industries undergo transformations, the demand for individuals with entrepreneurial skills continues to rise. These skills are essential for fostering innovation, driving economic growth, and creating job opportunities (Prufer and Prufer 2020). One of the primary reasons for the significance of identifying entrepreneurial skills is their role in driving innovation. Entrepreneurs excel at identifying gaps in the market and developing unique solutions to address them (Mayanja et al. 2021; Yeganegi et al. 2019). They possess a keen ability to identify opportunities, challenge the conventional norms, and think creatively (Zahra et al. 2006).

The entrepreneurial skill map, proposed by Pennetta et al. (2023), categorizes skills into four main groups: core entrepreneurial, managerial, technical, and personal. Core entrepreneurial skills empower individuals to identify market opportunities and take action by applying their ability to innovate; technical skills are industry-specific proficiencies that are vital for delivering products or services; personal skills enable entrepreneurs to be aware of, and responsive to, the business environment; finally, managerial skills involve essential capabilities for effectively managing and overseeing organizations on a daily basis.

1.2. Performance Management as a Key Managerial Skill for Entrepreneurs

Among the various managerial skills, performance management has been deemed as one of the most crucial for entrepreneurs to succeed. Performance management skills are crucial for entrepreneurs as they play a vital role in the success of their business ventures. These skills enable entrepreneurs to set clear goals, measure progress towards those goals, and make informed decisions based on performance data. Performance management skills are invaluable for entrepreneurs as they facilitate goal alignment, enhance productivity, support decision-making, promote employee engagement, ensure accountability and transparency, and drive continuous improvement. By actively managing performance, entrepreneurs can steer their businesses towards success and stay efficient, competitive, and resilient in a dynamic business environment (Aas and Alaassar 2018; Kokina et al. 2017; Sakhdari et al. 2020).

1.3. The Influence of Self-Perceptions and Beliefs on Entrepreneurial Entry Decisions

There are numerous factors that influence one's decision to pursue a career in entrepreneurship, contrary to the commonly held belief that personal wealth is the main motivator. These factors include various individual's beliefs and desires, which also play a significant role in determining whether they choose managerial roles instead. Entrepreneurs possess diverse self-perceptions, and this plays a crucial role in their motivation to start a new business. Studies on entrepreneurial self-perception examine the elements, such as personal identity and capabilities—particularly the ability to effectively manage company drivers—which ultimately shape one's decision to embark on a new venture. Launching a startup is not

merely an act; rather, it represents a substantial reflection of an individual's self-concept and identity. Consequently, an individual's perceived social identity has a substantial influence on their choice to pursue entrepreneurship since they view the venture as an extension of themselves (Gatewood et al. 1995; Fauchart and Gruber 2011).

The main aim of this paper is to introduce an online system dynamics-based interactive learning environment (ILE) designed to assess the performance management capabilities of wanna-be entrepreneurs, in accordance with the formative assessment paradigm. Through a simulated business environment, participants have the opportunity to virtually manage their own company while taking on various roles that mirror real-life scenarios related to the HR-performance relationship. The ILE has a feature that allows the assessment of such capabilities by measuring key indicators that determine the feasibility, effectiveness, and efficiency of their decision-making when running a firm within a specific operational context. From this standpoint, implementing a practical approach that enables entrepreneurs to confidently evaluate their capabilities for managing organizational performance in a protected environment (simulations) would streamline the process of determining whether they possess the essential prerequisites for launching a new business with success.

The procedures for carrying out the (self-)assessment of wanna-be entrepreneurs' performance management capabilities will be detailed. Some concrete assessment cases will also be presented with the aim of making it clearer what kind of outcomes the ILE can generate. Finally, some considerations will be made regarding the contribution that this tool can offer in the field of talent management and for the purposes of encouraging wanna-be entrepreneurs to participate in entrepreneurship educational (EE) programs.

2. The Role System Dynamics-Based Interactive Learning Environments in Fostering Formative Assessment

2.1. System Dynamics-Based Interactive Learning Environment, Constructivism and Learning

Scholars agree that learning occurs when learners actively engage with a system to reconstruct their mental models, beliefs, and habits (Phillips 1995; Pfeffer and Sutton 2000). Constructionists believe that it is crucial for learners to actively engage with the subject matter by experiencing and experimenting with it, instead of solely depending on the delivery of factual information, theories, formulas, and examples. They argue that learning is enhanced through feedback and an understanding of the consequences of our actions (Driscoll 2000). Transmission models of teaching do not offer this feedback, whereas interactive and constructionist approaches prioritize experimentation, which provides valuable feedback through close engagement with the material (Thomke 2003).

However, a major obstacle for the constructionist approach is that we cannot directly acquire practical knowledge or conduct experiments on crucial systems. In many cases, the impact of our decisions takes longer to manifest than the time available for learning, training, or even our own lifespan or career. Furthermore, there are certain scenarios where it is impractical or too costly and high-risk to conduct experiments, specifically when it is necessary to assess the consequences of ineffective utilization of company resources (Stermann 2014).

Simulations provide a potential solution to the problem since, by manipulating time and space, they can enable learners to simulate lengthy periods of time or significant events in a short span, such as simulating decades in the airline industry or a century of climate change within minutes. For addressing problems that require fast results, are expensive, unethical, or simply impossible to experiment with, simulations become the primary, and sometimes the only, means of understanding complex systems and identifying influential factors (Stermann 2014).

2.2. Formative Assessment and Learning

Many scholars recognize the importance of formative assessment and feedback in supporting learning (Black and Wiliam 2006). Research by Hattie (2012) shows that formative assessment is highly effective in promoting student achievement and that the integration of

formative assessment into teaching enhances student performance. Formative assessment also facilitates the development of skills such as explaining, interpreting, and reasoning. Timely and informative feedback, provided through formative assessment, offers various benefits. Formative assessment plays a crucial role in a teacher's ability to adjust their lessons and ensure student comprehension. Formative assessment, also known as assessment for learning, refers to evaluations of student performance that are intended to help students achieve their learning goals (Spector et al. 2016). This is different from formative evaluation, which involves judging how to improve the effectiveness of a program over time. While summative assessments aim to judge how well students have learned at the end of a teaching sequence, formative assessments focus on forming judgments about students' progress in order to inform future instruction. Formative assessments, which provide timely and informative feedback to students, can be considered a form of learning or assessments as learning, as they aim to help students improve their understanding (Spector 2015).

Formative Self-Assessment

There are alternative ways to nurture student learning beyond the conventional feedback loop between teacher and student. In addition to teacher feedback, self-assessment and peer assessment play significant roles in providing valuable feedback that aids students in their improvement. Students can benefit from reflecting on their own performance or by providing feedback to their peers. This type of feedback, known as self-assessment and peer assessment, is a significant part of the assessment process. By combining evidence-centered design, formative assessment frameworks, and computerized assessments, teachers and students can enhance their learning experiences. These approaches also aid in the evaluation and validation of assessments through technology. According to Sadler and Good (2006), students need to develop the ability to evaluate their own work by recognizing and comparing it with high-quality work. This kind of self-assessment promotes meta-cognition and self-regulation skills, which are essential for effective learning.

2.3. System Dynamics-Based Interactive Learning Environment as a Tool for Formative Assessment

Ellis (2013) and other researchers have highlighted the historical limitation of improving formative assessment due to the prevalence of face-to-face courses, which has made it difficult to capture and analyze learning interactions and outcomes for formative feedback and assessment. With technological advancements, there are now countless opportunities to gather and analyze performance and assessment data. These data provide valuable insights into students' progress across various educational activities.

Certain automated systems, such as the system dynamics-based ILEs, have the capability to capture data. However, what is truly important is the effective utilization of this data, as it can greatly benefit both learners and teachers (Spector 2014; Spector et al. 2016).

3. Method

An online interactive learning environment (ILE) designed to assess the performance management capabilities of wanna-be entrepreneurs, in accordance with the formative assessment paradigm was developed.

3.1. The Theoretical Foundation of the ILE

The proposed ILE is focused on the high-performance cycle (HPC) model described by Locke and Latham (1990). The HPC is a conceptual model that explains workplace motivation by incorporating goal setting theory, and offers a foundation for implementing interventions (Latham and Locke 2007). In essence, the HPC asserts that an employee's motivation is influenced by particular obstacles and requirements, such as challenging and specific goals. The main relationships among model variables and the goal moderators and mediators are mentioned in Figure 1.

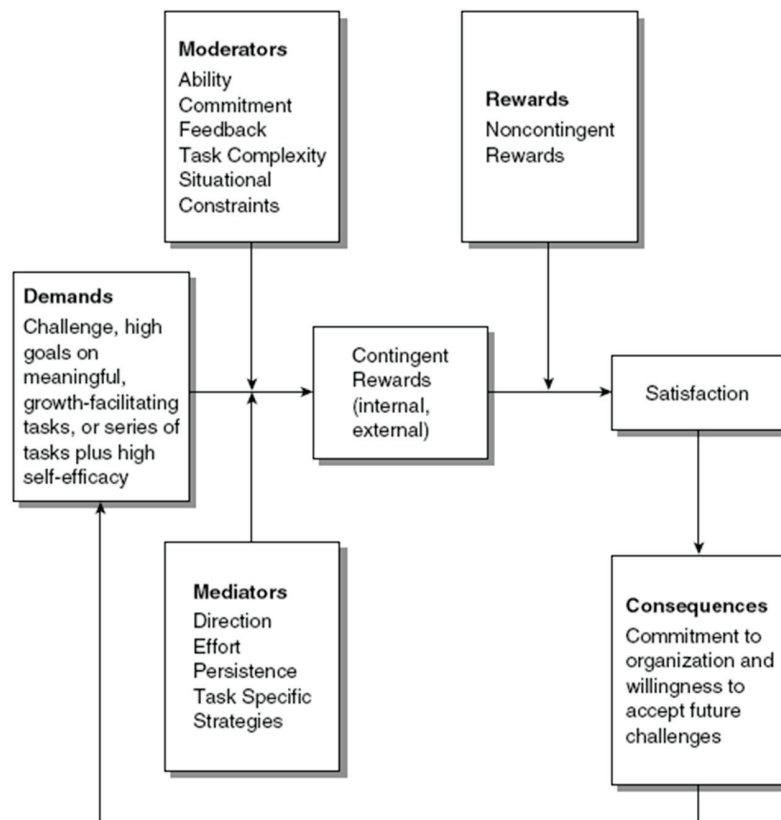


Figure 1. The high-performance cycle (HPC) model proposed by Locke and Latham (1990).

The impact of goals, expectancies, and self-efficacy on performance is widely recognized and has been comprehensively studied (Latham and Locke 1991; Locke and Latham 2002, 2004). Having high goals and self-efficacy increases individuals' perseverance in tasks compared with those with low goals and self-efficacy. Those with high goals are motivated to achieve their goals, while individuals with high self-efficacy have belief in their ability to succeed, which encourages them to persist even when faced with difficulties. High goals and self-efficacy also lead to greater effort and intensity in tasks that have time limits. Moreover, goals serve as a guiding force, directing attention and action towards actions that are relevant to achieving the goal, while disregarding actions that do not contribute to goal attainment. Additionally, goals inspire individuals to create plans in order to achieve their goals, which indirectly impacts performance. In a study involving a complex management simulation task, it was observed that both goals and self-efficacy enhance the quality of analytical strategies employed by participants, suggesting that goals, self-efficacy, and strategies all independently influence performance.

When individuals reach a certain level of performance, they may receive incentives or rewards, which can lead to certain outcomes. Numerous studies have shown that, when performance is rewarded under specific conditions (contingent rewards), it often results in satisfaction. It has been consistently observed that subjective reports of organizational commitment strongly correlate with satisfaction. When individuals are satisfied and content, they are more likely to show greater dedication and willingness to remain with the organization and embrace new opportunities. Therefore, when exposed to stimulating challenges, it is expected that their performance will be elevated (Latham and Locke 2007). The HPC offers an answer to the longstanding inquiry regarding the relationship between job satisfaction and performance. Contrary to asserting that job satisfaction has a direct influence on job performance, the HPC proposes that job satisfaction affects an employee's dedication to their organization, and that this devotion ultimately results in their willingness to tackle future challenges. Hence, the recursive aspect of the HPC, as depicted in Figure 1, is emphasized.

3.2. The Structure of the ILE

The proposed ILE, called “Michele’s Company”, is an engaging online game designed for both single or multiple players. In this game, participants aim to achieve their assigned goals or analyze system behaviors resulting from the decisions they make.

3.2.1. The ILE Interface

The interface presents players with information regarding the company profile (Table 1), the tasks assigned to students in multiplayer games (Table 2), and the roles and responsibilities of team members in multiplayer games (Table 3). The ILE dashboard displays the current and assigned goals, as well as the values of various other variables, such as:

- Performance: current and expected (desired) performance;
- Performance moderators: employee goal commitment; employee competence; employee well-being and employee self-efficacy;
- Performance Mediators: personal goals; expectancy of goal attainment and performance beyond expectation effect;
- Income statement: revenues; costs and profit.

Table 1. Michele’s company profile.

Michele lives in Paris and is 70 years old. For the past 50 years, he has worked as the CEO of the family business. The company was founded by his grandfather, Louis, in 1910 in a small warehouse on the outskirts of Paris. The company specializes in the production and wholesale of designer furniture. Under Michele’s leadership, the company has experienced significant growth and has become a solid presence in the industry. As of 2022, the company had 900 employees and closed its balance sheet with a turnover of €81 million and a gross profit of just over €12 million. However, in the last 3 years, Michele has been feeling tired and, despite his reluctance, has decided to retire. Since he has no children or other interested relatives to take over the management of the company, he must choose between selling the company or appointing an external CEO. After much contemplation, Michele decides to appoint an administrator. His wife, Joanna, is in agreement with this decision. He knows that his husband would not tolerate the idea of seeing the company he has dedicated his entire professional life to close. Michele chooses to appoint engineer Joseph Dreyfuss as the new CEO. Joseph has been Michele’s right-hand man for the past 15 years, and Michele has a great deal of trust in him. Since he does not intend to influence Joseph’s managerial decisions, Michele tasks the new CEO with building his own team of executives in the field of human resources, which Michele has always considered to be strategic for achieving performance objectives. In 2018, the company acquired a simulation model, a business intelligence tool that allows for the estimation of future turnover based on decisions made by the company’s management, with a particular focus on goal-oriented and strategic human resources development processes.

Engineer Dreyfuss is honored that Michèle chose him and feels a great sense of responsibility in leading the company towards a new phase of development. He recognizes the need to steer the company without Michèle’s influence and decides to prioritize the development of an intervention plan in the field of human resources to improve company performance. He firmly believes that focusing on human resources is crucial in achieving corporate objectives. To implement his plan, engineer Dreyfuss appoints three new managers to head three specific areas within the human resources department:

- Talent management area.
- Organizational well-being area.
- Personnel motivation area.

Together with the newly appointed managers, engineer Dreyfuss uses a simulator to carefully review and revise the company’s human resource strategies. He promotes a collaborative approach to ensure that the new strategies align with the company’s goals and objectives.

Table 2. The students' tasks (in the multiplayer game).

Some teams will be formed, each made up of four people. Each team's objective is to:
- Identify the cause-and-effect relationships underlying the trends (behaviors or outcomes) displayed by the system. - Manage the directional levers and the five human resource practices in order to increase company results.

Table 3. Roles and responsibilities of TEAM members (in multiplayer game).

The four members of each team will elect the CEO. The CEO will appoint the following managers from among the remaining three people:
- Talent manager. - Well-being manager. - Motivational manager.
The CEO is responsible for coordinating the activities of the entire group and implementing assigned goals.
The talent manager is tasked with planning talent acquisition strategies, developing internal promotion policies, and negotiating contracts and is also responsible for managing the following human resource practices: training, recruitment, and selection.
The motivational manager oversees employees, helping them learn new skills, perform job tasks, and achieve shared goals and is responsible for the following human resource practices: employee involvement and reward system.
The well-being manager is in charge of defining workplace well-being strategies and programs within the organization and is responsible for the following human resource practice: employee well-being.

The interface of the ILE displays a causal loop diagram (CLD) that illustrates the primary causal relationships among system variables. The CLD is a valuable tool for representing the feedback structure of systems and serves various purposes such as:

- Rapidly capturing ideas about the reasons behind dynamic behaviors.
- Gathering and documenting the cognitive models of individuals or teams.
- Conveying the important feedback loops that are thought to contribute to a problem.

3.2.2. The CLD of the ILE

A CLD includes variables connected by arrows, representing the causal influences between them. The diagram also identifies significant feedback loops. Figure 2 presents the causal loop diagram (CLD) of the ILE, illustrating the connections between variables through causal links depicted by arrows. Each causal link is given a polarity, either positive (+) or negative (-), to indicate how the dependent variable changes in response to changes in the independent variable. Additionally, the diagram highlights important loops by assigning loop identifiers, which differentiate between positive (reinforcing) or negative (balancing) feedback. A positive link suggests that an increase in the cause leads to a larger increase in the effect compared with what it would have been otherwise, while a decrease in the cause results in a greater decrease in the effect compared with what it would have been otherwise. Conversely, a negative link indicates that an increase in the cause leads to a decrease in the effect to below what it would have been otherwise, and a decrease in the cause causes an increase in the effect to a level above what it would have been otherwise.

In order to simplify the process of understanding the underlying feedback structure of the considered phenomenon (HPC), the causal loop diagram is drawn using the elements at the core of the stock-and-flow model. Moreover, some endogenous variables of the HPC model (such as contingent rewards) have been made exogenous in order to allow students to use them as human resource management practices on which to make decisions. The CLD provides valuable assistance to students as they seek to comprehend the intricacies of relationships within a system. These relationships are often non-linear and involve time delays between causes and effects.

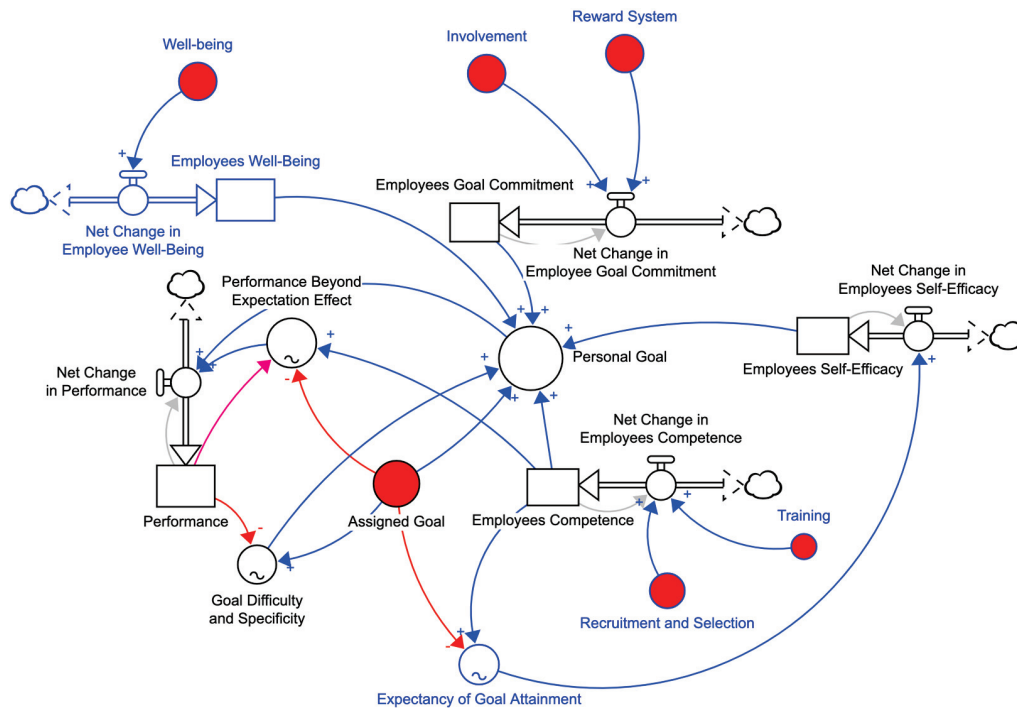


Figure 2. The causal loop diagram of the ILE.

Through the utilization of the CLD, students have the ability to effortlessly attribute importance to patterns (behaviors) that arise from the system. This includes considering the influence of scenario variables, such as current performance, and the decisions they make during the simulation. For a comprehensive understanding of the feedback structure of the ILE, please refer to the complete model equations outlined in Appendix A.

3.2.3. The ILE Dashboard

The simulation interface (Figure 3) encompasses both the user controls for manipulating the simulation and the visual outputs that display the effects of the simulation.

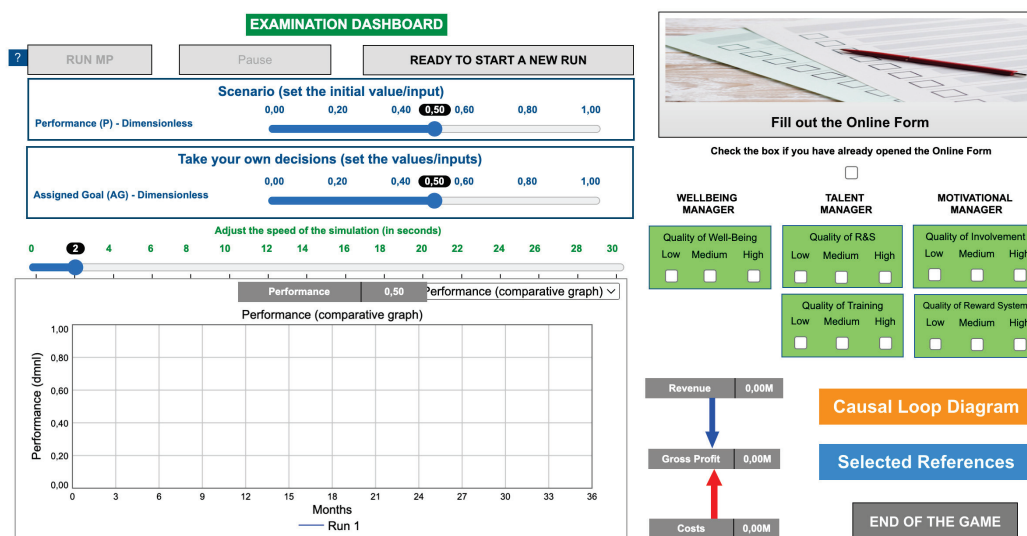


Figure 3. The ILE dashboard.

Another way to describe the simulation interface is to say that it acts as the channel through which simulation inputs and outputs are generated and illustrated.

During each run, player(s) make several types of decisions. They can: (a) change the initial value of the performance (scenario); (b) set the value of the assigned goal (expected or desired performance); or (c) manage the available human resource management practices to achieve the assigned goal.

At the conclusion of each run, the player(s) is required to fill out an online form, providing an explanation of the (theoretical) reasons for the system's behavior, based on the scenario and decisions made.

3.2.4. The ILE Features to Support the Online Formative Assessment Procedures

The online formative assessment is made possible by two main functionalities offered by the software (Stella Architect by isee System) with which the ILE was built and by the online platform that enables publishing the ILE on the web (isee Exchange): authentication and data collection.

Authentication enables the teacher to regulate access to one's simulations and grant entry exclusively to individuals (participants) of one's choosing. Instead of having the ability to effortlessly view one's published interface via a web browser, individuals will be required to log into the isee Exchange first. Additionally, they must have received an invitation from the teacher to access the simulation. If someone unauthorized tries to view one's published interface, they will encounter an error message.

Data collection is an effective method used to monitor and record user behavior during a published simulation. As users engage with the simulation, their activity is transmitted to the isee Exchange at various points, such as when the simulation is paused or upon its completion. The process of setting up data collection for multiplayer games is identical to that of single user simulations. As all players participate in the same run, the user's name is reported as the game's name or team name.

3.3. "Black Box" versus "Glass Box": Which Is More Beneficial for a System Dynamics-Based ILE?

The simulation activity is generally carried out after conceptually studying the phenomenon that is the subject of the simulation itself, in our case, HPC. However, this process can also be completely or partially reversed, thus allowing the participant to carry out simulations without having a preliminary and/or extensive knowledge of the underlying structure (cause-and-effect relationships between system variables and the value of parameters assigned to these relationships) that generates the observable behaviors of the system. The question of whether to anticipate (study) the theory and models of the considered phenomenon before inviting participants to launch the first simulations is related to the reflection on the didactic value of proposing an educational model characterized by an "glass box" or "black box" system.

The terms "black box" and "glass box" are used to describe the level of visibility into the structure of a system for the user. A black-box program only shows the inputs and outputs, while hiding everything in between. In contrast, a glass-box program allows the user to also see the internal workings (the feedback structure of the system).

Traditionally, the glass-box approach has been favored in education as it provides learners with full visibility into the system. However, in educational simulations, the opposite is often true. For simulations that aim to teach complex skills—such as performance management capabilities—or promote conceptual discovery, making the underlying model visible can hinder learning (Davidsen 1996; Spector et al. 2001). In these cases, a black-box approach may be more effective. However, providing learners with a transparent approach that allows them access to both causal and structural representations of a complex system is highly advantageous for learning. This transparency can be particularly helpful after an initial session of simulations, which are conducted without disclosing the underlying feedback structure of the system (Spector and Davidsen 1997).

Incorporating opportunities for reflection into the learning process enhances learning outcomes. This can be achieved by asking learners to explain their decisions in certain sentences. The act of pausing for reflection not only promotes interaction among small

groups (teams), which aligns with the collaborative nature of the learning environment, but also prevents learners from merely manipulating parameters without fully grasping the complexities of the system. Although it may initially feel burdensome, this pause offers learners valuable chances to collaborate and reflect. Learners are encouraged to document alternative decisions and provide explanations for why they were not chosen. This is made possible by the ILE in multiplayer mode, enabling teams to temporarily exit the active game, make different decisions, project into the future, and then return to the game to finalize their decision.

4. Results

In this paragraph, the formative (self-)assessment potentialities of the ILE will be concretely illustrated. Students can easily access the ILE by logging into the iSee Exchange platform. The ILE provides a diverse set of educational tools, including the CLD, papers, simulation dashboard, and charts. These tools are available for use in both single-player and multiplayer game modes.

4.1. Promoting Formative (Self-)Assessment through the ILE

The primary purpose of the ILE is to promote formative (self-)assessment, allowing users to run simulations and observe how the system reacts to their chosen scenarios and decisions. This enables participants to monitor and analyze the results, comparing different scenarios and decisions in order to evaluate the effectiveness of their strategies. In fact, during simulations, participants have the opportunity to actively intervene and modify system variables, observing how these changes impact overall performance. This allows for the experimentation and testing of different strategies and tactics in a risk-free environment. Simulations also provide the chance to explore hypothetical future scenarios and evaluate the long-term effects of current decisions. By taking this long-term perspective, participants can make more cautious decisions and adopt sustainable strategies, without the financial or operational risks associated with the real world.

Furthermore, participating in simulations helps students gain experience in making complex decisions and enhances their analytical and problem-solving skills. Overall, the ILE offers a safe and interactive platform for students to learn from their actions, make more informed decisions, and refine their decision-making abilities.

However, the authentication and data collection features of the platform also allow the teacher to carry out formative assessment. In fact, as already mentioned, the ILE allows the recording of the values that all of the variables of the system assume in the temporal horizon in which the simulation takes place (in this case, 36 months), including “directional” variables (that is, the managerial levers, such as assigned performance and the five human resource management practices) whose values can be modified at any time within the simulation’s time range (36 months).

Comparing the behaviors exhibited by the system in the light of the decisions made by the participants with the explanations provided by them to justify these behavioral patterns, it becomes quite easy for the teacher to assess how well a student is able to master the subject matter.

4.2. Two Cases of Formative (Self-)Assessment

Two different simulation sessions consisting of four runs each were conducted in single-player mode using the proposed ILE. In each run, participants made decisions regarding scenario variables such as initial performance and assigned objectives, as well as model parameters like changes in assigned objectives and actions on human resource management levers.

The ILE displays the results of each run, including the performance achieved and the corresponding gross profit earned by the company over a 36 month period. Gross profit is determined by the difference between revenue generated and costs incurred. As costs include investments in human resource management practices, participants must consider

not only which HR practices are most effective in achieving desired results, but also the sustainability of these investments and their ability to add value to the company.

The ILE also allows for both self-assessment and formative assessment, with a teacher or tutor interacting with participants to facilitate learning.

These simulations were conducted by the author solely for the purpose of demonstrating the process of (self-)formative assessment.

4.2.1. First Simulation Session

Before starting the simulation, the task given to the participant can be dual: (a) to optimize the company's resources in order to maximize the described performance and gross profit results or (b) to conceptually justify the trends shown by the variables of the business system in light of the decisions made, explicitly referring to the theory of HPC and goal setting.

These two tasks can also be assigned concurrently to a participant. Table 4 illustrates the results produced by each run of the first simulation session (performance values and gross profit realized by the company) in light of the decisions made by the participant.

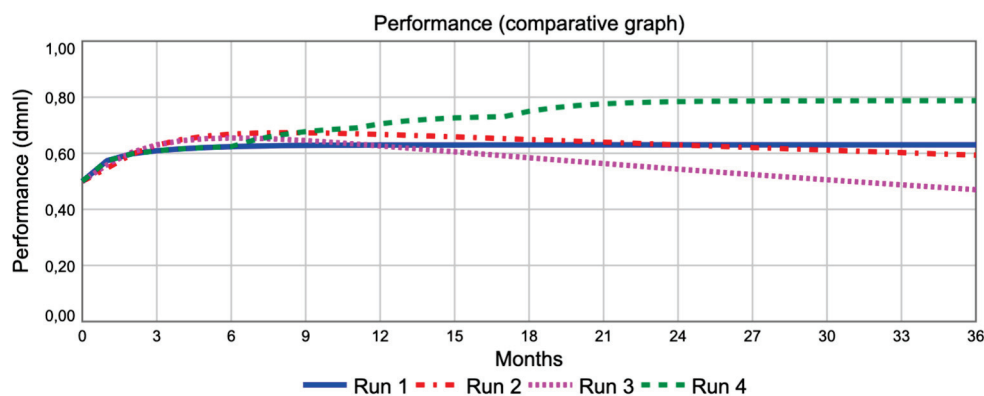


Figure 4. The graphs of the first simulation session.

Table 4. Overview of simulation results (first session).

RUN	Initial Condition	Change in						Results	Graphs
		AG	WB	T	I	RS	R&S		
1	P = 0.50; AG = 0.60							P = 0.63; GP = 15.12 M	See Figure 4
2	P = 0.50; AG = 0.80							P = 0.59; GP = 15.37 M	
3	P = 0.50; AG = 1.00							P = 0.59; GP = 13.93 M	
4	P = 0.50; AG = 0.60	0.8 T = 6°mo	M T = 16°mo	H T = 10°mo		M T = 10°mo		P = 0.79; GP = 16.73 M	

P = performance; AG = assigned goal (desired performance); T = time; mo = month; WB = well-being; T = training; I = involvement; RS = reward system; R&S = recruitment and selection; L = low; M = medium; H = high; GP = gross profit; M = millions of EUR.

Run #1

In this first run, the participant decides that the initial value of performance is 0.5 (all model parameters oscillate between 0 and 1) and that the assigned performance goal is 0.6. No decisions to modify the model parameters are made during the simulation. The results show a performance value of 0.63 and a gross profit value of 15.12 M.

The performance trend during the considered operating period (36 months) is shown in Figure 4. It can be observed that the model generates a performance value that not only reaches the set goal of 0.6 but even exceeds it. The student should therefore notice this

unexpected deviation (although it can be qualified as positive for the company) and try to justify it based on the HPC theory and goal setting.

Specifically, the most appropriate reference would be the theory of performance beyond expectation (Bass 1985), which occurs when individuals are not only motivated (express a high level of organizational commitment and commitment to the assigned goal) but also believe they possess all the necessary competencies to achieve the goal, which is therefore perceived as realistically attainable. The more the student is able to justify the patterns produced by the system by making explicit and specific references to the scientific literature on the observed phenomenon, the more they demonstrate their progress in consolidating their learning.

Run #2

In this second run, the participant decides that the initial performance value is set at 0.5 and that the target performance to be assigned is 0.8. During the simulation, no decisions are made to modify the model parameters. The results show a performance value of 0.59 and a gross profit value of 15.37 M.

The trend of performance during the considered operating period (36 months) is shown in Figure 4. It can be observed that the model generates a performance value that does not reach the desired target (0.8), although the gross profit value exceeds that observed in Run #1.

The student should justify the significant deviation between assigned goals and achieved goals by referring to the goal setting theory, which highlights how a goal perceived as excessively challenging can demotivate individuals, as it is considered unattainable based on the company's current resources and professional abilities.

Furthermore, if the participant were to conduct a comparative evaluation of the results produced by Run #1 and Run #2, they may observe how setting goals that initially seem achievable can yield appreciable results only in the short and medium term (0–18 months), and then experience a dramatic drop in performance once it becomes evident that the assigned goals are unattainable.

This explains how the higher gross profit value obtained in Run #2 compared with Run #1 is a direct consequence of the significant initial effort made by the staff to achieve the (excessively challenging) goal, but at the cost of increasing demotivation and lack of confidence in achieving the assigned goals (from month 18 to month 36). The decision to assign a performance target of 0.8 starting from 0.5—in the absence of other decisions to support the achievement of such a challenging goal—should therefore be evaluated as unsustainable over time.

Run #3

In this third run, the participant decides that the initial value of performance should be set at 0.5 and that the assigned performance goal be set at 1 (maximum value). No decisions to modify the parameters of the model are made during the simulation. The results show a performance value of 0.59 and a gross profit value of 13.93 M.

The performance trend during the considered operating period (36 months) is shown in Figure 4. It can be observed that the model generates a performance value that does not reach the desired goal (1), and that the gross profit value is significantly lower than that observed in Run #2.

The student should justify this difference by attributing it to the higher speed in which the personnel in Run #3 perceive their inability to reach the objective, triggering dynamics of demotivation and distrust much earlier than in during Run #2.

Run #4

In this fourth run, the participant decides that the initial value of performance will be 0.5, and that the assigned performance target will be 0.6. During the simulation, decisions are made that modify the model parameters related to certain human resource management

practices (employee well-being, training activities, and reward system). The results show a performance value of 0.79 and a gross profit value of 16.73 M.

The performance trend during the considered operational period (36 months) is shown in Figure 4. It can be observed that the model generates a performance value that is much higher than expected, along with a corresponding high gross profit value. These trends can be justified by referring to the theory of performance beyond expectation (insert bibliographic reference), as well as the positive role played by action on the moderators of the relationship between goals and performance (employee motivation, competence, and perceived well-being) through investment in human resource management practices (interventions on employee well-being, training activities, and enhancement of the reward system).

4.2.2. Second Simulation Session

Table 5 illustrates the results produced by each run of the second simulation session (performance values and gross profit realized by the company) in light of the decisions made by the participant.

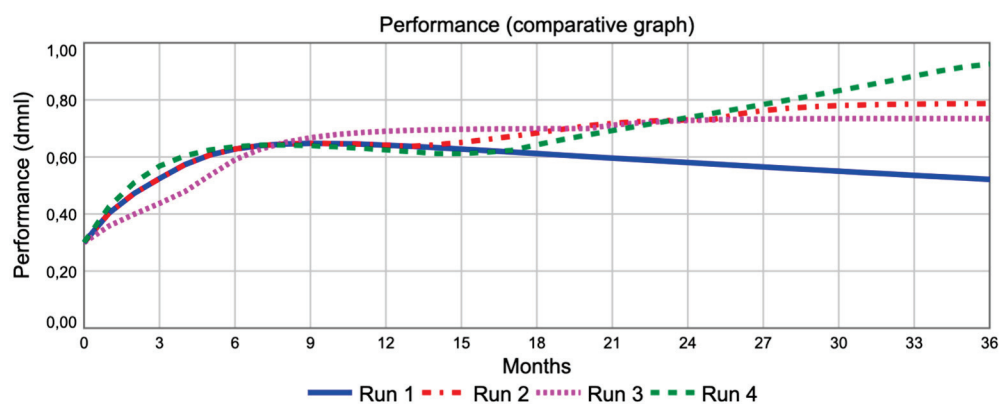


Figure 5. The graphs of the second simulation session.

Table 5. Overview of simulation results (second session).

RUN	Initial Condition	Change in						Results	Graphs
		AG	WB	T	I	RS	R&S		
1	P = 0.30; AG = 0.90							P = 0.52; GP = 14.00 M	See Figure 5
2	P = 0.30; AG = 0.90		H T = 16°mo	H T = 12°mo	M T = 24°mo		M T = 12°mo	P = 0.79; GP = 14.91 M	
3	P = 0.30; AG = 0.70	0.9 T = 12°mo	H T = 16°mo	H T = 18°mo	M T = 24°mo	M T = 18°mo	M T = 18°mo	P = 0.73; GP = 14.58 M	
4	P = 0.30; AG = 1.00	0.9 T = 12°mo	H T = 16°mo	H T = 12°mo	H T = 16°mo	H T = 12°mo	H T = 16°mo	P = 0.93; GP = 14.59 M	

P = performance; AG = assigned goal (desired performance); T = time; mo = month; WB = well-being; T = training; I = involvement; RS = reward system; R&S = recruitment and selection; L = low; M = medium; H = high; GP = gross profit; M = millions of EUR.

Run #1

In this first run of the second simulation session, the participant decides that the initial value of performance is set at 0.3 and assigns a performance target of 0.9.

During the simulation, decisions are made that modify the model parameters related to certain human resource management practices (worker well-being, training activities, commitment, and rewarding system). The results show a performance value of 0.79 and a gross profit value of 14.91 M. The performance trend during the considered operational period (36 months) is shown in Figure 5.

These trends should be justified by referring to the observations already made regarding the Run #3 of the first simulation session (Section 4.2.1, Run #3).

Run #2

In this second run, the participant decides that the initial value of performance is set at 0.3 and that the assigned performance target is 0.9. No decisions to modify the model parameters are made during the simulation. The results show a performance value of 0.52 and a gross profit value of 14.00 M. The performance trend during the operational period of 36 months is shown in Figure 5.

These trends should be justified by referring to the observations already made regarding Run #4 of the first simulation session (Section 4.2.1, Run #4), but it should be noted that the differences observed through the comparative evaluation between these two runs are due to the different timing of human resource management interventions.

The same considerations made for Run #2 (Section 4.2.2, Run #2) should also be made for the results obtained in Run #3 and Run #4 of this second simulation session (the performance trends during the operational period are shown in Figure 5).

5. Discussion

There are several obstacles that impede learning in complex dynamic systems. These obstacles stem from the intricate nature of the system itself, the long-term effects and possible delayed outcomes of decisions, and the existence of non-linear relationships within the system (Sterman 2000). However, the use of simulation-based learning environments can help overcome these barriers by compressing dynamics that would normally occur over extended periods of time. This allows for more effective learning in this domain by bypassing traditional obstacles. Sterman (2000) explains that the process of learning involves receiving feedback, but this process is hindered by several barriers in complex dynamic systems. Simulation-based learning environments can be instrumental in surmounting various obstacles, such as the intricacy of the system, the delayed effects of decisions, and the unforeseeable connections within it. These environments allow for compressing time and simulating dynamics that would otherwise occur over extended periods. Consequently, they help surmount traditional barriers, facilitating successful learning in this field.

5.1. The Transferability of the Adopted Methodology: Some Examples of ILE Applied to Different Contexts and Target Groups

The target of an interactive learning environment can vary depending on the specific context, but, generally, the goal is to provide learners with an engaging and effective way to acquire knowledge and develop skills in a particular subject or topic. Interactive learning environments can be used for various types of learners, from K-12 students to adults in corporate training programs, and can cover a wide range of subject areas, such as business management, mathematics, science, language learning, social sciences, entrepreneurial and vocational skills.

Some ILEs focused on different scientific domains are briefly presented below. This list is proposed merely as an example and without any claim to be exhaustive of the complexity and richness of the literature on the subject.

Bianchi and Bivona (2000) proposed an ILE that simulates the budgeting process of a small business. The aim of this ILE is to help learners grasp the concept of budgeting from a system-dynamics point of view, rather than relying solely on the traditional accounting perspective.

van Dijkum and Landsheer (2000) developed an ILE focused on juvenile criminal behavior. The significance of the domain lies in the fact that if an educational setting can successfully help young people understand the economic disadvantages of criminal activities, it could potentially make a significant impact on society as a whole.

The Sloan School of Management of the Massachusetts Institute of Technology has created six flight simulators focused on different scientific fields to facilitate the teaching of management principles through simulations. These simulators have distinct features, as briefly outlined in Table 6.

Table 6. The ILEs with some key attributes developed by the MIT Sloan School of Management (adapted from Sterman 2014).

ILE Title	Salt Seller	Eclipsing the Competition	Platform Wars	Fishbanks	CleanStart	World Climate
Strategic issues addressed	Pricing dynamics in imperfectly competitive markets	Strategy in the presence of learning curves and scale economies	Strategy in multisided platform markets; direct and indirect network externalities	Strategy for open access renewable resources	Entrepreneurship; marketing, product development, financing, employee ownership	Climate policy; negotiations; collective action
Scientific domains	Economics, strategy, decision making	Economics, strategy, technology and innovation, energy management, environmental management, sustainability	Economics, strategy, technology and innovation, system dynamics	Economics, strategy, negotiations, sustainability, environmental management, public policy, resource economics	Entrepreneurship, human resources, economics, strategy, sustainability	Economics, strategy, negotiations, sustainability, environmental management, public policy, resource economics

5.2. The Role Played by the Teacher and Learner in the Use of Interactive Learning Environments and the Benefits Generated for Them

The trainer and the learner using an interactive learning environment wears different “clothes” (roles) at the same time and they can also obtain appreciable benefits from using interactive learning environments, as respectively and briefly described in Tables 7 and 8.

Table 7. The different roles played by teacher and learner using ILE.

	Trainer		Learner
Facilitator	The role of a facilitator is crucial in the learning process. They act as a guide who introduces new information and concepts to learners, presenting it in a clear and organized manner. They break down complex topics into simpler parts and provide explanations and examples to help learners grasp the content. Facilitators also guide learners through different learning activities and exercises, ensuring they understand and apply what they have learned. They create a supportive and interactive learning environment where learners feel comfortable asking questions and seeking further clarification.	Self-Directed Learner	The individual sets learning objectives based on their career goals and job requirements, then creates a learning plan to achieve those objectives. They research and select courses, webinars, or books that align with their learning plan, and actively engage in the learning experience to acquire new knowledge and skills.
Assessor	The role of an assessor is to evaluate learners’ progress and provide feedback on their performance. Assessors design and administer various forms of assessments, such as quizzes, assignments, projects, or exams, to gauge learners’ understanding and mastery of the subject matter. They provide constructive feedback to learners, highlighting areas of strength and areas that need improvement. Assessors also assign grades or scores to learners’ work, objectively measuring their competence. This role helps learners understand their strengths and weaknesses, encouraging them to focus on areas that require further development.	Participant and Collaborator	The individual participates in training sessions and interactive learning activities, asking thoughtful questions and actively contributing to discussions. They apply what they have learned to real-world scenarios, seeking out feedback and coaching to improve their performance. The individual works with their peers to solve problems and complete projects, sharing their expertise and supporting others’ learning. They actively listen to feedback and apply it to improve their understanding of the subject matter.

Table 7. Cont.

	Trainer		Learner
Collaborator	The role of a collaborator is to foster a culture of collaboration and peer-to-peer interaction in the learning environment. Collaborators encourage learners to work together in groups, engaging in discussions, sharing ideas, and solving problems collectively. They create opportunities for learners to collaborate on projects, assignments, or group activities, promoting teamwork and the exchange of diverse perspectives. Collaborators facilitate effective communication and cooperation among learners, creating a supportive social environment that enhances the learning experience.	Referee and Self-Assessor	The individual provides constructive feedback to their peers, helping them to identify areas for improvement and offering suggestions for future learning opportunities. The individual regularly assesses their progress, identifying areas where they need to improve and setting new learning objectives. They seek out feedback from their peers and reflect on their own performance to adjust their learning strategy.
Advisor	The role of an advisor is to provide personalized guidance and support to learners. Advisors take into account learners' unique needs, interests, and goals, tailoring the learning experience to meet their specific requirements. They offer individualized advice on course selection, career planning, or further educational opportunities. Advisors also provide mentorship and counseling, helping learners overcome challenges, set realistic goals, and make informed decisions. By offering personalized guidance, advisors assist learners in maximizing their potential and achieving their desired outcomes.	Performer and Leader	The individual applies the knowledge and skills acquired during training to perform their job duties with proficiency and confidence, seeking out additional learning opportunities to stay up-to-date on best practices and trends. The individual shares their expertise with others, mentoring and coaching team members to improve their performance. They advocate for continuous learning and professional development within their organization, encouraging their peers to adopt these learning styles as well.

Table 8. The different benefits for teacher and student using ILE.

	Trainer		Learner
Enhanced Student Engagement	Interactive learning environments actively involve learners, promoting better educational outcomes and improved student engagement, which, in turn, ensures that learners have a better learning experience.	Personalized Learning	Interactive learning environments can adapt to suit learners' individual learning styles, making the learning experience more personalized and effective
Real-time Assessment	Interactive learning environments provide instant feedback to learners, which helps instructors to identify areas that require attention and adjust their teaching strategies accordingly.	Interactive Learning Experience	Interactive learning environments offer learners the opportunity to engage actively in the learning process, facilitating better retention of knowledge.
Increased Efficiency	Interactive learning environments enable instructors to manage larger class sizes, delivering content more efficiently and cost-effectively.	Real-time Feedback	Interactive learning environments provide learners with instant feedback, which helps them to identify gaps in their knowledge and improve immediately.
Improved teaching skills	Interactive learning environments allow instructors to refine and practice their teaching skills, with vicariously gained role-playing experiences.	Collaborative Learning	Interactive learning environments encourage learners to work collaboratively, which has proven benefits for memory retention and enhanced peer learning.

As highlighted in Tables 7 and 8, ILEs offer significant benefits for both the instructor and the learner. Instructors can manage larger class sizes, assess learners' progress in real-time, practice their teaching skills, and provide learners with personalized learning experiences. Learners, on the other hand, can engage actively in the learning process, receive real-time feedback, and benefit from collaborative learning experiences. The interactive learning environment offers an immersive and engaging experience that maximizes the learning potential of both parties (Solórzano-García et al. 2022; Yen and Lin 2022).

Furthermore, because the ILE in single-player mode invites the student to manage multiple directional levers and that the ILE in multiplayer mode encourages them to discuss and agree with their colleagues over the strategies to adopt in order to achieve the expected objectives, this teaching methodology stimulates the development of plural-entrepreneurial abilities in the student (Burger-Helmchen 2008).

6. Conclusions

The paper presents a new interactive learning environment that aims to improve the skills and knowledge of aspiring entrepreneurs in effectively managing complex performance management capabilities. This environment plays a crucial role in guiding and supporting the formative self-assessment process for these individuals.

The ILE utilizes causal feedback loop diagrams, which incorporate the stock and flow "language" to visually demonstrate the interconnectedness of various elements within the system. This diagram helps learners better understand the structure of the model and how it influences the behavior of the system. These features of ILE enhance the users' formative self-assessment process.

This ILE has the potential to enhance learning and knowledge transfer in performance management through the application of a system dynamics model and simulation. As a result, it could be effectively utilized in entrepreneurship education programs. In fact, the ILE encourages users to engage in formative self-assessment by running simulations and observing how the system responds to their chosen scenarios and decisions. This allows participants to assess and analyze the outcomes, comparing various scenarios and decisions to gauge the effectiveness of their entrepreneurial strategies. During simulations, participants can actively intervene and modify variables within the system, witnessing how these changes impact overall performance. Simulations also provide the opportunity to explore hypothetical future scenarios and assess the long-term consequences of present decisions.

To further advance the development of this educational methodology, the next phase would involve expanding the system barriers by including additional significant variables from the HPC model. These variables could encompass proximal and distal learning and performance goals, personality variables, and the framing effect. Alternatively, integration with other pertinent entrepreneurial components, such as opportunity assessment decisions, decisions pertaining to exploiting opportunities, and entrepreneurial exit decisions, should also be considered. These enhancements could further incentivize wanna-be entrepreneurs to participate in entrepreneurship educational programs.

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Appendix A. Full Model Equations

Variable Name	Equation	Properties	Units
Stock variables			
Costs(t)	$\text{Costs}(t - dt) + (\text{Costs_Inflow}) \times dt$	INIT Costs = 0	EUR
Employees_Competence(t)	$\text{Employees_Competence}(t - dt) + (\text{Net_Change_in_Employees_Competence}) \times dt$	INIT Employees_Competence = 0.7	Dimensionless
Employees_Goal_Commitment(t)	$\text{Employees_Goal_Commitment}(t - dt) + (\text{Net_Change_in_Employee_Goal_Commitment}) \times dt$	INIT Employees_Goal_Commitment = 0.7	Dimensionless
“Employees_Self-Efficacy”(t)	$\text{“Employees_Self-Efficacy”}(t - dt) + (\text{“Net_Change_in_Employees_Self-Efficacy”}) \times dt$	INIT “Employees_Self-Efficacy” = 0.7	Dimensionless
“Employees_Well-Being”(t)	$\text{“Employees_Well-Being”}(t - dt) + (\text{“Net_Change_in_Employee_Well-Being”}) \times dt$	INIT “Employees_Well-Being” = 0.7	Dimensionless
Performance(t)	$\text{Performance}(t - dt) + (\text{Net_Change_in_Performance}) \times dt$	INIT Performance = 0.5	Dimensionless
Revenue(t)	$\text{Revenue}(t - dt) + (\text{Revenue_Inflow}) \times dt$	INIT Revenue = 0	EUR
Flow variables			
Costs_Inflow	$(\text{Revenue_Inflow} \times 0.85) + (\text{Overall_effort_for_HR_practices} \times \text{Cost_for_HR_practice}) / \text{Time_to_Costs}$		EUR/Months
Net_Change_in_Employee_Goal_Commitment	$\text{MIN}(1 - \text{Employees_Goal_Commitment}; \text{Reward_System} + \text{Involvement}) / \text{EGC_Adjustment_Time}$		Dimensionless/ Months
“Net_Change_in_Employee_Well-Being”	$\text{MIN}(1 - \text{“Employees_Well-Being”}; \text{“Well-being”}) / \text{WB_Adjustment_Time}$		Dimensionless/ Months
Net_Change_in_Employees_Competence	$\text{MIN}(1 - \text{Employees_Competence}; (\text{Training} + \text{Recruitment_and_Selection})) / \text{EC_Adjustment_Time}$		Dimensionless/ Months
“Net_Change_in_Employees_Self-Efficacy”	$\text{MIN}(1 - \text{“Employees_Self-Efficacy”}; (\text{“Employees_Self-Efficacy”} \times \text{Expectancy_of_Goal_Attainment} \times \text{“EGA_on_S-E_Effect”}) - \text{“Employees_Self-Efficacy”}) / \text{“E_S-E_Adjustment_Time”}$		Dimensionless/ Months
Net_Change_in_Performance	$((\text{Personal_Goal} \times \text{Performance_Beyond_Expectation_Effect}) - \text{Performance}) / \text{Performance_Adjustment_Time}$		Dimensionless/ Months
Revenue_Inflow	$(\text{Performance} \times \text{Revenue_for_Performance}) / \text{Time_to_Revenue}$		Euros/Months

Variable Name	Equation	Properties	Units
Auxiliary and input variables			
Activate_1_YR_PAUSE	0		Dimensionless
Activate_I[Low]	$-0.2 \times \text{"Activate_I-Low"}$		Dimensionless
Activate_I[Medium]	$0.05 \times \text{"Activate_I-Medium"}$		
Activate_I[High]	$0.2 \times \text{"Activate_I-High"}$		
"Activate_I-High"	0		Dimensionless
"Activate_I-Low"	0		Dimensionless
"Activate_I-Medium"	0		Dimensionless
Activate_R&S[Low]	$-0.1 \times \text{"Activate_R\&S-Low"}$		Dimensionless
Activate_R&S[Medium]	$0.05 \times \text{"Activate_R\&S-Medium"}$		
Activate_R&S[High]	$0.1 \times \text{"Activate_R\&S-High"}$		
"Activate_R&S-High"	0		Dimensionless
"Activate_R&S-Low"	0		Dimensionless
"Activate_R&S-Medium"	0		Dimensionless
Activate_RS[Low]	$-0.2 \times \text{"Activate_RS-Low"}$		Dimensionless
Activate_RS[Medium]	$0.05 \times \text{"Activate_RS-Medium"}$		
Activate_RS[High]	$0.2 \times \text{"Activate_RS-High"}$		
"Activate_RS-High"	0		Dimensionless
"Activate_RS-Low"	0		Dimensionless
"Activate_RS-Medium"	0		Dimensionless
"Activate_T-High"	0		Dimensionless
"Activate_T-Low"	0		Dimensionless
"Activate_T-Medium"	0		Dimensionless
Activate_Training[Low]	$0 \times \text{"Activate_T-Low"}$		Dimensionless
Activate_Training[Medium]	$0.1 \times \text{"Activate_T-Medium"}$		
Activate_Training[High]	$0.2 \times \text{"Activate_T-High"}$		
Activate_WB[Low]	$-0.2 \times \text{"Activate_WB-Low"}$		Dimensionless
Activate_WB[Medium]	$0.05 \times \text{"Activate_WB-Medium"}$		
Activate_WB[High]	$0.2 \times \text{"Activate_WB-High"}$		
"Activate_WB-High"	0		Dimensionless
"Activate_WB-Low"	0		Dimensionless
"Activate_WB-Medium"	0		Dimensionless
Assigned_Goal	0.5		Dimensionless
Cost_for_HR_practice	2,500,000		EUR/ Dimensionless
"E_S-E_Adjustment_Time"	1		Months
EC_Adjustment_Time	1		Months
"EGA_on_S-E_Effect"	IF Expectancy_of_Goal_Attainment = 1 THEN ("Employees_Self-Efficacy" + (1 – "Employees_Self-Efficacy")) $\times$ 1.02 ELSE 1		Dimensionless
EGC_Adjustment_Time	1		Months

Variable Name	Equation	Properties	Units
Expectancy_of_Goal_Attainment	GRAPH(MIN(1; (Employees_Competence/ Assigned_Goal))) Points: (0.5000, 0.98), (0.5500, 0.982), (0.6000, 0.984), (0.6500, 0.986), (0.7000, 0.988), (0.7500, 0.99), (0.8000, 0.992), (0.8500, 0.994), (0.9000, 0.996), (0.9500, 0.998), (1.0000, 1)		Dimensionless
Goal_Difficulty_and_Specificity	GRAPH(Assigned_Goal/Performance) Points: (0.000, 1.000), (0.125, 1.000), (0.250, 1.000), (0.375, 1.000), (0.500, 1.000), (0.625, 1.000), (0.750, 1.000), (0.875, 1.000), (1.000, 1.000), (1.125, 1.077), (1.250, 1.189), (1.375, 1.000), (1.500, 0.900), (1.625, 0.776630599122), (1.750, 0.733049523696), (1.875, 0.702415575137), (2.000, 0.679)		Dimensionless
Gross_Profit	Revenue-Costs	REPORT IN TABLE AS STOCK	EUR
Involvement	MIN((1 – Employees_Goal_Commitment); SUM(Activate_I))		Dimensionless
Online_Form_is_active	0		Dimensionless
Overall_effort_for_HR_practices	“Well-being” + Involvement + Training + Reward_System + Recruitment_and_Selection		Dimensionless
Performance_Adjustment_Time	3		Months
Performance_Beyond_Expectation_Effect	GRAPH(IF Employees_Competence > Assigned_Goal AND Assigned_Goal >= 0.6 THEN Performance × 2 ELSE 0) Points: (0.7000, 1), (0.7300, 1.005), (0.7600, 1.01), (0.7900, 1.015), (0.8200, 1.02), (0.8500, 1.025), (0.8800, 1.03), (0.9100, 1.035), (0.9400, 1.04), (0.9700, 1.045), (1.0000, 1.05)		Dimensionless
Personal_Goal	MIN(MIN(MIN(MIN((Assigned_Goal × Goal_Difficulty_and_Specificity); Employees_Competence); Employees_Goal_Commitment); “Employees_Well-Being”); “Employees_Self-Efficacy”)	REPORT IN TABLE AS STOCK	Dimensionless
Recruitment_and_Selection	MIN((1 – Employees_Competence); SUM(Activate_R&S))		Dimensionless
Revenue_for_Performance	4,500,000		EUR/ Dimensionless
Reward_System	MIN((1 – Employees_Goal_Commitment); SUM(Activate_RS))		Dimensionless
Sim_Duration	2		Seconds
TIME_GAME	TIME × Activate_1_YR_PAUSE		Months
Time_to_Costs	1		Months
Time_to_Revenue	1		Months
Training	MIN((1 – Employees_Competence); SUM(Activate_Training))		Dimensionless
WB_Adjustment_Time	1		Months
“Well-being”	MIN((1 – “Employees_Well-Being”); SUM(Activate_WB))		Dimensionless

Run Specs	
Start Time	0
Stop Time	36
DT	1/1
Fractional DT	True
Save Interval	1
Sim Duration	36
Time Units	Months
Pause Interval	0
Integration Method	Euler
Keep all variable results	True
Interaction Mode	Flight Simulation
Run By	Run by Module
Calculate loop dominance information	False

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