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If we never do it, we will never know

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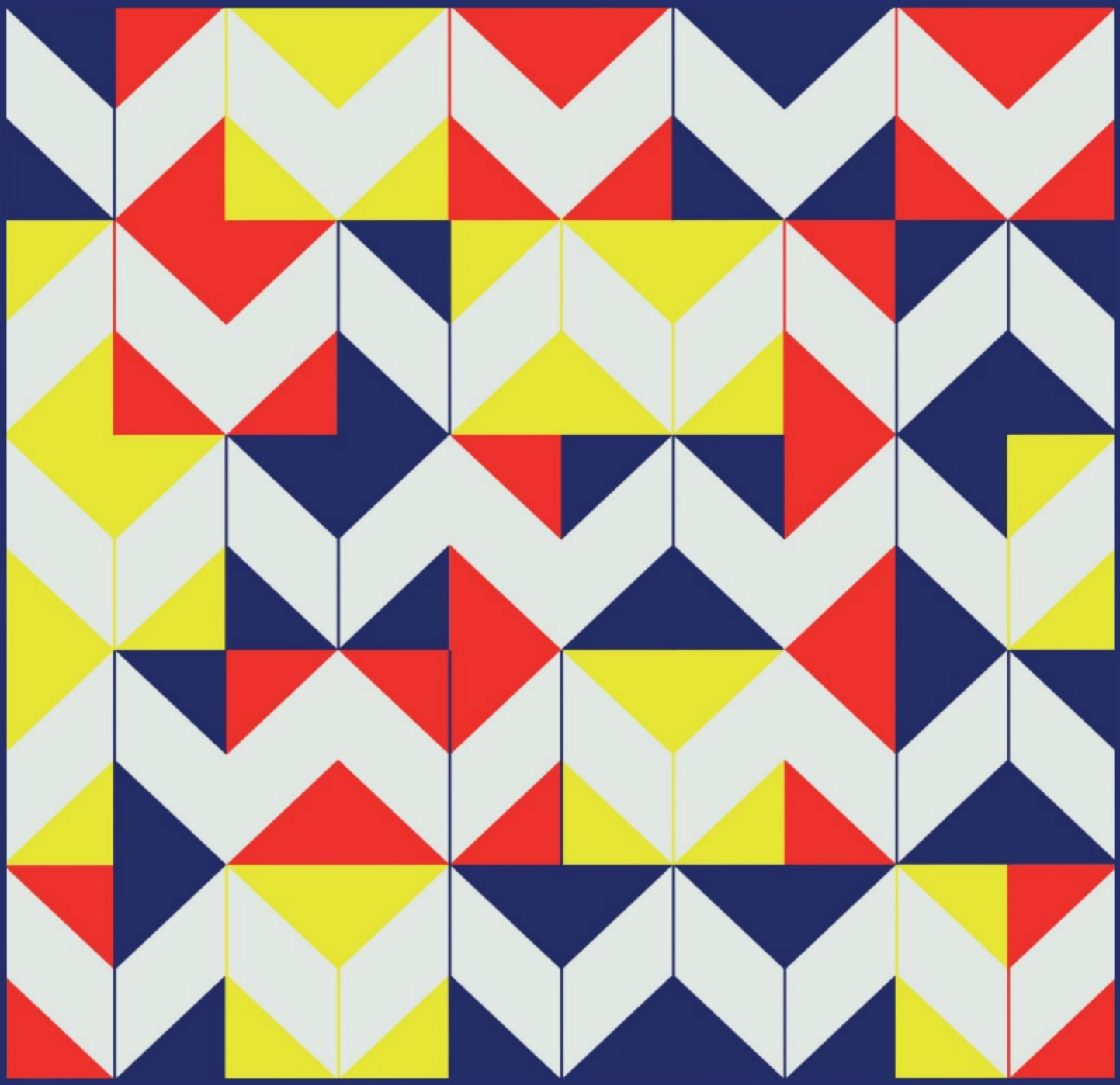

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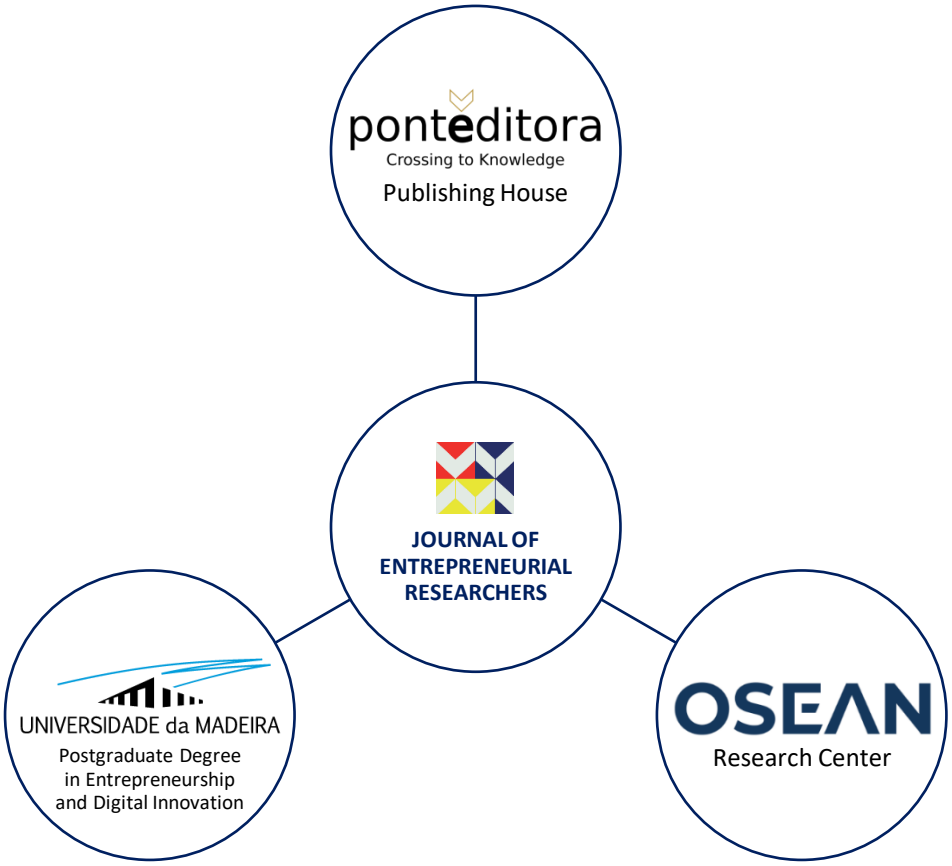

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TABLE OF CONTENTS

EDITORIAL
ENTREPRENEURSHIP AND TRANSFORMATIONS: CHALLENGES AND PERSPECTIVES IN A CHANGING WORLD

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Eduardo Leite, University of Madeira, OSEAN—Outermost Regions Sustainable Ecosystem for Entrepreneurship and Innovation, Portugal, eduardo.leite@staff.uma.pt.

We live in times of uncertainty, where the transition to a new reality proves to be challenging, especially when considering organizational and personal resistances to change. However, the urgent need for adaptation is evident, particularly in the face of the consequences of the Anthropocene, as described by Leite et al. (2022).

Despite the frequent call for a return to "normal," it is crucial to question the desirability of this habitual state, given its influence on environmental issues, unchecked population growth, and unsustainable consumption. Additionally, the concept of "normal" is associated with "business as usual," routine, lack of initiative, and passivity, even in the face of prior knowledge of its negative impacts, as evidenced by Arendt (1964) and Primo Levi (1958).

On the other hand, technology, despite its undeniable advantages, imposes a high cost on employment, adding complexity to the scenario. Since the pandemic, despite its devastating effects, there has been significant pressure to adopt emerging technologies. In this regard, the recent World Economic Forum (WEF, 2023) report on the jobs of the future highlights the imminent newness of 85% of professions by 2030, requiring a radically different preparation for future professionals.

In this changing landscape, the challenge society is facing is monumental, starting with the university, where the disparity between educational offerings and market demands is evident, as emphasized in the WEF's 2023 report. Curriculum updates are imperative to ensure graduates are prepared for a constantly disruptive market. There is a need for a greater focus on education centered on the development of critical thinking, problem-solving, creativity, and empathy. The WEF report identifies emerging areas of demand, emphasizing the growing importance of social and emotional skills, as well as specific skills such as artificial intelligence, data analysis, and programming, requiring requalification and continuous learning.

Similarly, the evolution of the professional landscape requires a proactive stance from organizations. Disregarding the need for adaptation is risking obsolescence. Thus, we live in times of transformation and the renunciation of the conventional, to appreciate what is unique, extraordinary, and sometimes even peculiar. In the 20th century, Russian formalists, belonging to the literary school from 1910 to 1930, dedicated themselves to analyzing this phenomenon, which they called estrangement. As highlighted by Viktor Chklovski (1893–1984), one of the main representatives of the formalists, in "Art as Device," estrangement is a process of making something less familiar, followed by the construction of individuality and singularity.

In this context of change, entrepreneurship emerges as a catalyst to break with the "normal," take risks, introduce innovations, and contribute to the construction of sustainable value. Aware of this, we founded the *Journal of Entrepreneurial Researchers*, bringing together a team of excellence to provide a space for critical reflection and in-depth analysis of these challenges and opportunities.

As we navigate these uncertain waters, we invite readers to explore the pages of this edition, seeking to shed light on the various paths of entrepreneurship. To start, we highlight the innovative study by Tatiana Iakovleva from the University of Stavanger and Mette Adkins from Laerdal Medical AS, which explores the complex relationships

between the university environment, entrepreneurial intentions, and the activities of two fundamental groups: the academic faculty and students. Focusing on a medium-sized university in Norway, the research uses Scott's three-dimensional framework, highlighting the regulatory, normative, and cognitive structures that make up the university context.

The findings reveal the significant influence of the university context on entrepreneurial intentions and self-efficacy of students, contrasting with the academic faculty whose intentions seem to be less affected. The study emphasizes the importance of collaboration between the university and industry, emphasizing the need for rules, rewards, knowledge, and social acceptance to enhance these collaborations.

This work contributes significantly to the dialogue on entrepreneurial universities, emphasizing that success in promoting entrepreneurial behaviors is intrinsically linked to aligning these activities with the personal and organizational objectives of the individuals involved. Additionally, by recognizing the greater adaptability of students to entrepreneurial initiatives compared to the academic faculty, this study suggests new approaches to inspire an entrepreneurial culture within higher education institutions.

Another highlight is the research led by Albertina Monteiro, Andreia Alves, and Amélia da Silva, from the Polytechnic of Porto, which conducts an in-depth analysis of the current state of accounting and management control practices in companies adopting e-commerce strategies. Using a methodology that includes a systematic review of scientific literature from 2000 to 2023, the study employs bibliometric techniques to identify temporal evolution, prominent authors, institutions, journals, and relevant countries, as well as analyzing the citation network.

The results of the analysis suggest a significant increase in interest in the intersection between accounting and e-commerce in recent years. This increase can be attributed to the strategic role that e-commerce plays in the innovation and efficiency of businesses, especially driven by the adaptation of business models during the global pandemic three years ago. This paper not only contributes to understanding these practices but also serves as an essential guide for new researchers interested in exploring this fascinating intersection between accounting and e-commerce strategies.

The study conducted by Luís Sardinha, Micaela Vieira, Áurea Sousa de Sousa, and Eduardo Leite on the pioneering project "Digital Nomads Madeira Islands" (DNMI), launched in the Autonomous Region of Madeira (ARM) in 2021, offers an in-depth view of the evolution of digital nomads from 2020 to 2022. Through a questionnaire, the quantitative and descriptive research aims to understand the reality of digital nomads in the ARM.

The sample, consisting of 14,960 digital nomads registered under the DNMI project by Startup Madeira, provides a comprehensive insight, highlighting the global diversity of these remote professionals. The study not only informs about the present but also serves as a valuable foundation for future planning and similar initiatives in other regions interested in attracting digital nomads.

Carlos Costa Gomes, affiliated with ESSNorteCVP, delves into considerations about the concepts of ethics and happiness, highlighting the direct connection between them. The research, addressed in two parts, explores the interrelation between ethics, values, and happiness, engaging with thinkers like Aristotle, Daniel Serrão, and Damásio. The conclusion highlights a compatible eurhythmia, demonstrating the complex but complementary relationship between these fundamental concepts. This article not only explores the philosophical richness of these themes but also offers a valuable perspective on how ethics and happiness can coexist in different streams of thought.

The article conducted by Eduardo Leite, Maria Leite, and Ana Leite explores the complex intersection between Artificial Intelligence (AI) and human rights. The discussion covers the need to adapt human rights protection laws to

technological innovations, with a detailed review of legal and ethical concerns related to AI. This work aims to deepen the understanding of these evolving issues, emphasizing that the discussion is still in exploratory stages in an increasingly technology-driven world intersected by human rights.

Finally, the article by Joel Sepúlveda, from the Innovalia Association, addresses a theoretical and conceptual approach for entrepreneurs wishing to establish new businesses within the context of the European data strategy. It highlights the paradigm shift in data consumption and the growing significance of a data-driven economy. The article underscores the need for effective data management across all sectors and how products and services increasingly rely on innovation through the integration of various data sources. It discusses the emergence of European common data spaces, emphasizing strategic sectors and their role in promoting data sharing.

In summary, this issue of the *Journal of Entrepreneurial Researchers* offers a rich variety of perspectives and significant contributions to contemporary dialogues on entrepreneurship, innovation, and the interdisciplinary challenges we face. We invite readers to explore these articles actively and participate in these essential discussions for our time.

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ETHICAL STATEMENT

EFFECTS OF UNIVERSITY CONTEXT ON STUDENTS' AND UNIVERSITY EMPLOYEES' ENTREPRENEURIAL INTENTIONS, SELF-EFFICACY AND INDUSTRY COLLABORATION

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ABSTRACT

This study examines the influence of a university's environment on the entrepreneurial intentions and activities of its faculty and students. Focusing on a medium-sized, relatively young university in Norway, the research investigates how university context (UC), defined through Scott's three-dimensional framework (regulative, normative, and cognitive structures), impacts two groups: university teaching and research faculty (referred to as "academic faculty") and students.

Key findings show that UC significantly influences students' entrepreneurial intentions and self-efficacy, but not those of academic faculty. A possible reason is that academic faculty, having committed to academia, might not align their values with entrepreneurial activities, viewing their role more as providing high-quality research and education rather than commercializing innovations. However, industry collaboration is seen positively by academic faculty, primarily motivated by expanding knowledge and accessing research funding.

The paper also finds that fostering a university context supportive of industry collaboration through rules, rewards, knowledge, and social acceptance can further enhance such collaborations. The study contributes to the discussion on entrepreneurial universities by highlighting that the effectiveness of promoting entrepreneurial behavior is dependent on aligning these activities with the personal and organizational goals of the individuals involved. It notes that students, without pre-set professional goals, are more adaptable to entrepreneurial initiatives compared to academic faculty.

KEYWORDS: Academic Faculty; Entrepreneurial Intentions; Self-Efficacy; Scott's Three-Dimensional Framework; University Context.

INTRODUCTION

This article explores the evolving role of universities in fostering entrepreneurial initiatives, a subject of considerable debate in academic circles. The core question is whether universities should extend their traditional roles of education and research to include a "third role" — facilitating knowledge spillover through entrepreneurial activities. The concept of "entrepreneurial university," popularized by the Bayh-Dole Act in the United States and its European equivalents, envisions universities as incubators for entrepreneurship, potentially enriching local and national economies. The assumption among policy makers is that the entrepreneurial university will contribute to inspire more entrepreneurs among students and academic faculty and in turn increase the direct contribution of universities to local and national economy (Foss & Gibson, 2015). The debate is linked to two domains — knowledge transfer through commercialization of research-based innovation (D'Este and Perkmann, 2011, Clarysse et al., 2011,) as well

as stimulating student entrepreneurial activities (Fayolle et al., 2006; Liñán and Chen, 2009, Jung et al., 2001, Segal et al., 2005).

The first domain examines the growing interest of academic faculty in entrepreneurial pursuits, alongside efforts to bridge the gap between research endeavors and their commercial application (Bruneel et al., 2010; Rasmussen et al. 2006). Investigations into the entrepreneurial motivations of scientists reveal a general acceptance and desire for commercial ventures (Stuart & Ding, 2006). Yet, there is a scarcity of concrete evidence demonstrating similar entrepreneurial inclinations among academics from non-scientific disciplines. Conversely, partnerships between academia and industry play a significant role in facilitating the transfer of knowledge from educational institutions to the business sector (Perkmann et al., 2013; Foss et al., 2013).

In the second domain, attention is directed towards the university's contribution in encouraging student engagement in entrepreneurial ventures. This is achieved by fostering an entrepreneurial atmosphere, incentivizing entrepreneurial actions through regulations and incentives, and enhancing intellectual understanding via specialized educational courses designed for entrepreneurial pursuits (Liñán, & Fayolle, A. 2015; Matlay, 2006; Oftedal, Iakovleva & Foss, 2018).

The current research adds value to both these domains by empirically testing the proposition that a university environment conducive to entrepreneurship and industry collaboration can potentially amplify entrepreneurial intentions, self-confidence in entrepreneurial abilities, and collaboration between academia and industry among both university faculty and students.

THEORY

ENTREPRENEURIAL UNIVERSITY ENVIRONMENT

The concept of the 'entrepreneurial university' has become a focal point in higher education discourse, stimulating vigorous debate among scholars, policymakers, and educational practitioners. The term itself was popularized in the late 20th century, reflecting a paradigm shift in the traditional roles of universities, expanding beyond education and research to include a third mission: fostering entrepreneurship and innovation (Etzkowitz, 2003; Clark, 1998).

At the heart of this debate is the question of whether and how universities should engage in entrepreneurial activities. Proponents of the entrepreneurial university model argue that in an increasingly knowledge-driven economy, universities play a critical role in promoting innovation and contributing to economic development (Etzkowitz et al., 2000; Shane, 2004). This perspective is underpinned by the belief that universities, through their unique position in society, can act as catalysts for regional and national economic growth by commercializing research, fostering spin-offs, and promoting a culture of entrepreneurship among students and faculty (Wright et al., 2007).

Critics, however, caution against the risks associated with the entrepreneurial model. They argue that an overemphasis on commercialization and market-driven objectives can undermine the fundamental academic values of universities, such as academic freedom, disinterested inquiry, and public service (Bok, 2003; Slaughter & Leslie, 1997). There is a concern that the pursuit of commercial interests could skew research agendas towards marketable products at the expense of basic, curiosity-driven research (Mowery et al., 2004).

The implementation of the Bayh-Dole Act in the United States in 1980, and similar legislation in Europe, has been a catalyst for this shift towards entrepreneurialism in universities. These laws allowed universities to retain intellectual property rights for research funded by the government, thus encouraging them to engage in patenting and licensing activities (Mowery et al., 2004; Grimaldi et al., 2011). This legislative change has been instrumental in the emergence

of university-industry partnerships, contributing significantly to the commercialization of academic research (Geuna and Nesta, 2006).

The role of university leadership is also critical in driving the entrepreneurial agenda. Clark (1998) identified five elements essential for an entrepreneurial university: a strengthened steering core, an expanded developmental periphery, a diversified funding base, a stimulated academic heartland, and an integrated entrepreneurial culture. This framework suggests that for a university to be entrepreneurial, it must possess not only the capacity for innovation but also the institutional infrastructure to support and sustain entrepreneurial activities (Rothaermel et al., 2007).

Another dimension of the debate focuses on the impact of entrepreneurial activities on teaching and learning. While some argue that an entrepreneurial focus enhances the educational experience by providing students with practical skills and exposure to real-world challenges (Binks et al., 2006), others raise concerns about the potential erosion of educational quality and the neglect of fundamental academic disciplines in favor of more lucrative, market-oriented fields (Brennan & McGeevor, 1988).

In conclusion, while the entrepreneurial university model offers significant potential for economic and societal benefits, it also poses challenges and risks that require careful consideration and management. Balancing the commercial imperatives with the traditional academic ethos remains a central issue in the ongoing debate surrounding the entrepreneurial university.

DRIVERS OF ENTREPRENEURIAL UNIVERSITIES

The drivers of entrepreneurial universities, a concept that emerged as a pivotal theme in higher education, are diverse and complex. These drivers can be broadly categorized into individual and organizational factors, each playing a crucial role in shaping the entrepreneurial character of universities. Below we will enlighten individual drivers such as entrepreneurial intentions, self-efficacy and benefits associated with industry collaboration. This discussion will be further extended to include organizational factors, in particular regulatory, cognitive and normative landscape of organization.

ENTREPRENEURIAL INTENTIONS AND SELF-EFFICACY

The shift towards entrepreneurial universities is significantly influenced by the entrepreneurial spirit of individual academics. Scholars like Audretsch et al. (2006) and Shane (2004) highlighted that individual researchers' motivations to commercialize their research findings are a key driver. Factors such as personal ambition, the desire for recognition, and the potential for financial gain are significant motivators.

The engagement in entrepreneurial activities can be explained by behavioral theories and therefore research has evolved around entrepreneurial intention as a powerful theoretical framework (Linan & Fayolle, 2015). Personality characteristics such as risk-taking propensity, tolerance of ambiguity and internal locus of control have been found to be strongly associated with entrepreneurial intentions in previous research (Ang & Hong, 2000; Davey et al., 2011). Furthermore gender, family background and experience have often shown to impact intentions to start up a business (Linan & Fayolle, 2015; Wang & Wong, 2004).

The individual skillset and expertise of academics play a crucial role. Murray (2004) notes that skills in research and innovation, combined with entrepreneurial acumen, are critical for transitioning ideas from the lab to the market. Self-assessed business competences (self-efficacy) have proved to be a reliable predictor of entrepreneurial intentions (Ajzen, 1991; Iakovleva & Kolvereid, 2009; Krueger et al., 2000; Linan & Chen, 2009; Jung et al., 2001). The construct of self-efficacy has been widely applied in psychology as an individual difference variable. Self-efficacy is an individual's cognitive estimate of his or her "capabilities to mobilize the motivation, cognitive resources and courses of action needed to exercise control over events in their lives" (Wood & Bandura, 1989). Self-efficacy is

believed to be related to one's choice of activities, one's effort and persistence to perform these activities, as one's thought processes and emotional reactions when confronted by obstacles (Bandura, 1997; Lent, Brown, & Hackett, 1994). Self-efficacy theory essentially endeavors to describe and measure a person's perceived competency to achieve a desired goal. Self-efficacy is concerned not with the skills one has, but with one's judgments of what one can do with whatever skills one possesses.

Self-efficacy is acquired gradually through the development of complex cognitive, social, linguistic, and/or physical skills that are obtained through education and experience (Bandura, 1982; Gist, 1989). Thus, the acquisition of skills through past achievements reinforces self-efficacy and contributes to higher aspirations and expectations of positive future performance (Herron & Sapienza, 1992). Research examining self-efficacy and knowledge gains, or similar outcomes, has found that pre-training self-efficacy measures positively predict a person's learning performance (e.g., Gist, Schwoerer, & Rosen, 1989; Martocchio & Webster, 1992).

One important effect of self-efficacy is on the choice of behavior settings. To the extent that people plan and choose their career paths they assess their personal capabilities against the requirements of different occupations. This assessment of their personal capabilities therefore directs people to prepare for and enter occupations in which they feel confident (Wood & Bandura, 1989). Starting one's own business or initiating a new venture is often described as a pure and intentional career choice. Consequently, entrepreneurial self-efficacy may play an important role in uncovering the essential skill set needed throughout the various stages of the new venture development process. Recent studies proposed that self-efficacy may provide one way to measure entrepreneurial potential (Iakovleva and Kolvereid 2008; Kickul et al., 2007; Linan & Chen, 2009; Zao et al., 2005). A recent meta-analysis of 26 studies with a sample size of 5,065 firms (Miao, Qian & Ma, 2017) found that entrepreneurial self-efficacy is positively related to firm performance. This study further showed that there is no difference in the role of self-efficacy among nascent and old firms. Thus, suggesting that ESE should be developed and supported by firms regardless of age in order to ensure positive performance.

INDUSTRY COLLABORATION

Academic engagement encompasses collaborative endeavors between universities and various external entities, particularly businesses, often characterized by direct, interpersonal interactions (Cohen et al., 2002). This collaboration spans multiple levels, influenced both by individual attributes and the broader organizational and institutional milieu, as analyzed in Perkmann et al.'s (2013) comprehensive review of the subject.

There is a growing consensus that while policies often prioritize commercialization, such emphasis may overshadow the substantial benefits that academia derives from industry partnerships. These benefits extend beyond financial gains, as many academics seek industry engagement to advance their research pursuits (D'Este & Perkmann, 2011; Perkmann et al., 2013). D'Este & Perkmann (2011) note that the pursuit of commercial interests is generally secondary for academics, with the majority primarily driven by the desire to solve complex, intriguing problems.

Moreover, not all academics operate at the forefront of pioneering research. As such, Perkmann et al. (2013) stress the importance of distinguishing between the external engagement activities of those leading in their fields and those who are not as deeply involved in cutting-edge research. The authors further propose that collaboration with industry might serve as an alternative means for resource acquisition, particularly for institutions that may not have access to ample funding.

Additionally, Perkmann et al. (2013) indicate a nuanced relationship between academic engagement and commercialization. Often, commercialization emerges as a secondary outcome or an extension of academic-industry collaborations, regardless of whether it was an initial goal of the engagement.

In essence, academic engagement with industry is a complex, multi-faceted phenomenon shaped by various individual and organizational factors. It not only aids in the progression of academic research but also often leads to commercial endeavors, demonstrating the interconnected nature of academic and industrial spheres. In the theory of industry collaboration in academic settings, perceived knowledge and resource benefits play a significant role. Perceived *knowledge benefits* refer to the intellectual and informational gains that academic faculty and students acquire through collaboration with industry partners. These benefits include access to practical insights, exposure to industry-specific challenges, and the integration of theoretical knowledge with real-world applications. A study by Perkmann et al. (2013) highlights how such collaborations enrich academic research and teaching by providing new perspectives and knowledge that are otherwise inaccessible within the confines of university settings.

On the other hand, perceived *resource benefits* involve tangible assets and support gained from industry partners. These resources could include funding, access to specialized equipment, and opportunities for joint research ventures. According to a study by Davey et al. (2016), resource benefits significantly enhance the capacity of academic institutions to conduct advanced research and foster innovation. These benefits are not limited to financial support but also extend to the provision of materials, human resources, and access to industrial networks, as discussed by Ankrah and AL-Tabbaa (2015).

Both knowledge and resource benefits are crucial in fostering a collaborative environment that bridges the gap between academia and industry, leading to mutually beneficial outcomes for both sectors.

UNIVERSITY CONTEXT

While individual behavioral traits such as entrepreneurial intentions, self-efficacy, and perceptions about the benefits of industry collaboration are important, they are significantly influenced by the surrounding organizational context. Recent studies have shown that the institutional structures of universities can have a profound impact on the development and success of entrepreneurial programs across different cultures and countries (Foss & Gibson, 2015; Valdez & Richardson, 2013; Williams & Vorley, 2015). This perspective aligns with institutional theory as outlined by Scott (2014), which posits that an organization acts as a framework that shapes and promotes specific behaviors among its members. In the context of universities and entrepreneurship, this theory helps provide a more comprehensive understanding of the entrepreneurial university model, as discussed in recent literature (Tolbert et al., 2011; Oftedal et al., 2018).

Adding to this, the study by Sancho et al. (2021) examines the moderating role of entrepreneurial climate in fostering effects of the entrepreneurial education on the entrepreneurial intentions of students. This research highlights the importance of a supportive entrepreneurial climate at the university can enhance the effect of entrepreneurship-oriented training on entrepreneurial activities.

These studies underscore the ongoing evolution in understanding the dynamics between university structures and entrepreneurial activities, emphasizing the need for strategic institutional approaches and support systems to nurture entrepreneurship within academic settings. Universities, as centers of knowledge development, inherently possess structures that promote knowledge acquisition. However, they also exhibit traits of institutional rigidity, as noted by Bercovitz and Feldman (2008), indicating a paradoxical nature of being both conducive to and resistant to change.

This study employs Scott's (2014) framework to analyze the institutional context in universities, focusing on regulative, cognitive, and normative structures. Scott describes institutions as comprising regulative, normative, and cultural-cognitive elements that collectively confer stability and meaning to social life. The university context, examined through these pillars, reveals that regulative aspects pertain to formal rules and regulations, normative aspects to informal norms and values, and cognitive aspects to shared knowledge and interpretations.

REGULATIVE STRUCTURES

The regulative structure within universities, characterized by formal rules and regulations, significantly impacts the behavior and actions of individuals within these institutions. This notion aligns with Scott's (2014) assertion that such structures play a pivotal role in shaping organizational behavior. In the context of universities, these regulations can influence a wide range of activities, from research and teaching methodologies to entrepreneurial ventures. Kraaijenbring et al. (2009) and Saeed & Muffato (2012) have explored how these regulative frameworks within universities encourage or hinder entrepreneurial activities, particularly among students. Their findings suggest that when universities have supportive policies and a regulatory environment conducive to entrepreneurship, there is a noticeable increase in entrepreneurial engagement among students. Similarly, Turker and Selcuk (2009) found that regulatory structures in universities could either facilitate or impede the entrepreneurial intentions and activities of their members.

Building upon these findings, additional research in this area further elucidates the impact of regulatory frameworks on university entrepreneurship. For instance, a study by Guerrero and Urbano (2012) examined how specific policies and regulations within universities influence the entrepreneurial intentions of students and faculty. They found that universities with more supportive regulatory environments had higher rates of entrepreneurial activities.

Similarly, a study by Fayolle & Redford (2014) explored how different types of university regulations, such as intellectual property policies and research commercialization guidelines, affect the entrepreneurial activities of university members. Their research indicated that clear and supportive regulatory policies could significantly enhance the entrepreneurial capabilities of university students and faculty.

These studies collectively highlight the critical role of the regulative structure within universities in fostering an entrepreneurial culture. They suggest that supportive regulations and policies can encourage entrepreneurial activities, while restrictive or unclear regulations can hinder them.

COGNITIVE STRUCTURES

The cognitive aspect of the organizational climate, as Scott (2014) describes, is pivotal in shaping behaviors within academic settings, especially in entrepreneurial universities. This aspect is primarily about the collective understanding and interpretation of social realities, influencing the entrepreneurial mindsets of faculty and students.

In the realm of entrepreneurial universities, the cognitive climate is marked by a shared focus on innovation, entrepreneurship, and the practical application of research. According to a study by Fayolle and Redford (2014), the cognitive aspect in these universities includes the attitudes and beliefs about the value and process of commercializing research and starting new ventures. They found that in environments where entrepreneurship is positively viewed and understood, there is a greater propensity for faculty and students to engage in entrepreneurial activities.

Klofsten et al. (2019) further explored this by examining how the cognitive environment within universities influences students' entrepreneurial intentions. Their findings suggest that a university environment that is cognitively aligned with entrepreneurial values and knowledge significantly boosts students' interest and confidence in starting their own businesses.

Moreover, Siegel and Wright (2015) looked into how cognitive factors within universities impact technology transfer and commercialization activities. They found that universities with a strong cognitive orientation towards entrepreneurship tend to have more effective technology transfer offices, as the shared understanding within the institution supports these activities.

A study by Grimaldi et al. (2011) also contributes to this discussion. They investigated the impact of cognitive aspects on the formation of academic spin-offs and discovered that universities where entrepreneurship is an integral part of the academic culture tend to produce more successful spin-off companies.

These studies underscore the significance of the cognitive climate in shaping entrepreneurial behaviors in universities. They highlight that when universities nurture a cognitive environment that values and understands entrepreneurship, it encourages both faculty and students to engage more actively in entrepreneurial activities, leading to outcomes like increased spin-offs and effective technology transfer.

NORMATIVE STRUCTURES

The normative dimensions in an organizational context, particularly in universities, are crucial in shaping the entrepreneurial landscape. These dimensions are comprised of the informal values and norms that guide behavior and establish the standards for acceptable practices and goals. They are significant in influencing how university members, including students and faculty, perceive and engage in entrepreneurial activities.

Several studies have empirically investigated the impact of these normative elements in the context of universities. For instance, Westhead and Solesvik (2016) and Welter et al. (2011) have explored how gender influences entrepreneurial intentions, indicating that normative values around gender roles can significantly impact individuals' inclination towards entrepreneurship. Similarly, Liñán, Moriano, and Jaén (2016) have examined how cultural values shape entrepreneurial intentions, highlighting the importance of societal norms in molding entrepreneurial behaviors.

In addition to these factors, studies specifically focusing on university environments have further elucidated the role of normative dimensions in fostering entrepreneurship. Bae et al. (2014) and Rauch & Hulsink (2015) have found a strong correlation between the presence of entrepreneurship programs in universities and the entrepreneurial intentions and motivations of students. This suggests that when universities endorse and support entrepreneurial activities through their programs, it creates a normative climate that encourages students to consider entrepreneurship as a viable and desirable career path.

Oosterbeek et al. (2010) and Souitaris et al. (2007) have also contributed to this field by demonstrating how the content and structure of university entrepreneurship programs can impact students' attitudes toward entrepreneurship. Their findings suggest that not only the presence but also the quality and approach of these programs play a significant role in shaping students' entrepreneurial aspirations.

Furthermore, recent studies have expanded this understanding. For example, a study by Nabi et al. (2017) explored how university support systems and the presence of entrepreneurial role models within the university influence students' perceptions and attitudes towards entrepreneurship. They found that these factors create a normative framework that strongly influences students' entrepreneurial intentions.

Additionally, Urbano et al. (2018) investigated the impact of university policies and support structures on faculty members' involvement in entrepreneurial activities. Their findings indicate that when universities have strong normative support for entrepreneurship, faculty members are more likely to engage in entrepreneurial research and activities.

These studies collectively highlight the importance of normative dimensions in shaping the entrepreneurial culture within universities. They emphasize that the values, norms, and informal guidelines prevalent in university settings significantly influence both students' and faculty members' attitudes and behaviors towards entrepreneurship.

In summary, this study utilizes Scott's framework to dissect the multifaceted nature of the university organizational climate, underscoring how its regulative, cognitive, and normative structures collectively influence the propensity for innovation and entrepreneurial activity within academic institutions.

Based on the discussion above, we made a suggestive argument that regulative, normative and cognitive dimensions of the university context might be related to entrepreneurial intentions, self-efficacy, and perceived benefits of industry collaboration. The following set of hypotheses are suggested:

TABLE 1: Perception of University Context in Relation to Entrepreneurial Intentions, Self-efficacy and Industry Collaboration.

N	GROUP	HYPOTHESES
H1.1	Regulative Structure	Academic faculty's positive perception leads to higher entrepreneurship intentions and self-efficacy.
H1.2	Normative Structure	Academic faculty's positive perception leads to higher entrepreneurship intentions and self-efficacy.
H1.3	Cognitive Structure	Academic faculty's positive perception leads to higher entrepreneurship intentions and self-efficacy.
H1.4	University Context on Industry Collaboration (combined regulative, normative, and cognitive structures)	Academic faculty's positive perception leads to higher industry collaboration involvement
H2.1	Regulative Structure	Students' positive perception leads to higher entrepreneurship intentions and self-efficacy.
H2.2	Normative Structure	Students' positive perception leads to higher entrepreneurship intentions and self-efficacy.
H2.3	Cognitive Structure	Students' positive perception leads to higher entrepreneurship intentions and self-efficacy.

METHODOLOGY

In our study, we utilized a representative sample comprising 226 academic faculty members and 495 students from a Norwegian university. The survey, conducted online, was distributed via email to both students and faculty, with the university rector facilitating this outreach. Our target demographic included PhD students and post-doctoral researchers, categorized as faculty, as well as all enrolled students. Participants from all university faculties were invited to engage in the survey, which was designed to be anonymous to ensure confidentiality.

The HR department provided email lists, which included 1,442 faculty members and 9,900 students. Additionally, the student survey was promoted on university-affiliated social media platforms. The overall response rates were 16% for faculty and 5% for students.

Prior to its official launch, the survey underwent a thorough pre-testing phase. This involved students from the university's business school, faculty from three diverse departments, a professor specializing in research methodology from another Norwegian university, an employee from the technology transfer office, and a professional surveyor not affiliated with academia. In total, eight individuals contributed to this review process.

The majority of the survey responses were received via email invitations. Participation was limited to faculty members actively involved in teaching and/or research. The survey period spanned from December 2017 to January 2018. On average, students completed the survey in 7 minutes, while faculty members took 9 minutes. As an incentive, students could opt to participate in a draw for one of two restaurant vouchers, each valued at

approximately €100. No incentives were offered to faculty members. Those agreeing to partake in subsequent qualitative interviews waived their right to anonymity.

To accommodate language preferences, the surveys were available in both Norwegian and English. Approximately 10% of faculty responses and 25% of student responses were submitted in English. The tables below provide details about the samples.

TABLE 2: Characteristics of Survey Sample of Academic Faculty.

CHARACTERISTIC	PERCENTAGE (%)
GENDER	
Female	50
Male	50
EMPLOYMENT STATUS	
Permanent Employees	66
Full-time Employees	86
FACULTY DISTRIBUTION	
Science and Technology	29
Health Sciences	16
Social Sciences	12
Arts and Education	27
Business School	11
Other Faculties	5
AGE DISTRIBUTION	
20–29 Years	7
30–39 Years	20
40–49 Years	30
50–59 Years	24
60+ Years	18
ENTREPRENEURIAL AND INDUSTRY COLLABORATION	
Licensed an Idea	3
Patented an Idea	6
Started a Business at Some Point	25
Currently Involved with a Business	8
Started a Business Based on Research	11

Collaboration Projects with Industry (Past 2 Years)	51
Projects with ≥30% Financing from Industry	34
Aware of the Technology Transfer Office (TTO)	37
EMPLOYMENT DURATION	
Mean/Median Years of Employment	8.8 / 6

Significantly, 51% of the respondents have participated in industry collaboration projects within the past two years, highlighting a strong connection between the university and the industry sector. This rate surpasses the 11% of respondents who have started a business based on their research, indicating that while there is a notable entrepreneurial spirit, the emphasis is more towards collaborative efforts with industry partners rather than independent entrepreneurial ventures.

Additionally, 34% of the survey participants have been involved in projects where more than a third of the funding came from industry sources. This figure underscores the university's successful engagement in securing industry support and resources, which is a crucial aspect of practical collaboration and knowledge exchange between academia and industry.

The demographic composition of the survey participants — evenly split between genders, predominantly permanent and full-time employees, and spread across various age groups — provides a stable backdrop for these engagements. The presence of a diverse faculty, with significant representations from science and technology as well as arts and education, further complements the university's capacity for broad and interdisciplinary industry collaborations.

However, entrepreneurial activities, especially those originating from research, appear to be less prevalent in comparison. With 25% of respondents having started a business at some point, and a more modest 11% having launched a venture based on their research, it suggests that while entrepreneurship is present, it's not as dominant as industry collaborations. This could reflect a university environment that is more conducive to collaborative innovation rather than independent entrepreneurship or might point to the need for enhanced support for translating research into entrepreneurial ventures.

In conclusion, the university demonstrates a strong inclination towards industry collaboration, overshadowing its engagement in independent entrepreneurial activities, especially those stemming from academic research. This highlights the university's role as a collaborative partner in the broader industrial ecosystem, actively contributing to and benefiting from these external engagements.

The table below describes the student's sample.

TABLE 3: Characteristics of Survey Sample of Students.

ITEM	PERCENTAGE (%)
GENDER	
Female	53
Male	47
STUDENT LEVEL	
Bachelor Students	41
Master Students	50
FACULTY DISTRIBUTION	
Science and Technology	40
Health Sciences	10
Social Sciences	15
Arts and Education	20
Business School	11
Other Faculties	4
AGE DISTRIBUTION	
Up to 20 Years	11
21–25 Years	35
26–30 Years	26
31+ Years	28
Mean/Median Age (Years)	28.3 / 26
STUDENT STATUS	
Full-time Student	89
ENTREPRENEURIAL AND INDUSTRY ENGAGEMENT	
Participated in Entrepreneurial Activities	15
Industry Collaboration as Part of Studies	33
Awareness of Technology Transfer Office (TTO)	15

The student demographic at the Norwegian university, as portrayed in the table, presents a distinct profile, particularly when compared to academic faculty in terms of entrepreneurial activities and industry collaboration.

In this student sample, 15% have engaged in entrepreneurial activities. This rate is notable but might be lower compared to the academic faculty, who often have more experience and access to resources conducive to

entrepreneurship. The students' involvement in entrepreneurial ventures reflects an emerging interest and potential in this area, which could be further nurtured through university programs and initiatives.

Regarding industry collaboration, 33% of the students have participated in such activities as part of their studies. This suggests a proactive approach to integrating practical industry experience into academic learning. However, this rate may be less than that of the faculty, who typically have more opportunities and established networks for industry engagement. The students' involvement in industry collaboration is a positive indicator of the university's efforts to bridge academic learning with real-world applications and industry needs.

Looking at the overall student sample, the gender distribution is almost evenly split, with a slight majority of female students (53%). The sample primarily comprises Bachelor (41%) and Master (50%) students, indicating a strong presence of both early-stage and advanced learners in the university.

The age distribution skews younger, with the majority of students falling in the 21–30 age range, capturing the typical age group for university education. A smaller segment of the student population is aged 31 and above, bringing in diverse life experiences and perspectives.

In terms of faculty distribution, students are spread across various disciplines, with the largest group being in the Faculty of Science and Technology (40%). Other faculties, such as Health Sciences, Social Sciences, Arts and Education, and the Business School, also have significant representations, highlighting the multidisciplinary nature of the university.

The average student spends about 8.8 years at the university, with a median of 6 years, suggesting a commitment to their academic pursuits over a substantial period. The high percentage of full-time students (89%) reflects a dedicated student body, fully immersed in their university experience.

Awareness of the Technology Transfer Office (TTO) among students is relatively low (15%), indicating potential areas for growth in terms of fostering an entrepreneurial and innovation-friendly environment.

Overall, the student sample from the Norwegian university shows a vibrant and diverse academic community, with a strong inclination towards integrating practical experience and industry exposure into their academic journey, albeit at a different scale compared to the faculty members.

MEASUREMENT INSTRUMENTS

We used well developed scales for dependent variables when possible and adapted them for the needs of present research. Scales used for industry collaboration were based on D'Este & Perkmann (2011). Scales for entrepreneurial intent were based on Clarysse et al. (2011), Linan & Chen (2009), Kolvereid (1996) and Krueger, Reilly & Carsrud (1999). Scales for entrepreneurial self-efficacy were developed from DeNoble (1999) and McGee et al. (2009). We used a recently developed scale for the independent variable University Context. Scales for university context in the student survey replicated those developed by Oftedal et al. (2018). Scales for university context in the academic faculty survey were adjusted versions of those developed by Oftedal et al. (2018). 5-point Likert scales were used in all questions measuring entrepreneurial self-efficacy and intent, industry collaboration and university context. Principal Component analysis was used to create reliable scales for the constructs, and multiple regression analysis was utilized to test the hypothesis.

DEPENDENT VARIABLES

ACADEMIC FACULTY SURVEY

Entrepreneurial intentions measured in the academic faculty survey were developed based on Clarysse et al. (2011), Linan & Chen (2009), Krueger et al. (1999) and Kolvereid (1996). We used the following 4 statements to measure entrepreneurial intentions among academic faculty: (1) "I frequently identify opportunities to start up new businesses", (2) "I have very seriously thought of starting a business", (3) "I intend to start a business one day", (4)"It is very likely that I will start my own business in the next 5 years." The Chronbach alpha was 0,92.

Self-efficacy measure for the academic survey was adopted from DeNoble (1999) and McGee et al. (2009) and implies 4 items: (1) "I frequently identify ideas that can be converted into new products or services", (2) "I am good at identifying the market potential for a new idea", (3) "I am good at identifying partners that can help me convert an idea into a new product/ service," (4) "I easily identify people who have the right skills to join a start-up team." The Chronbach Alpha was 0.932.

In our study, we approached the measurement of *industry collaboration* by dividing it into two distinct constructs: the perceived *benefits of knowledge access* and the *perceived benefits of resource access*. The scales developed for this purpose were self-constructed but drew inspiration from the work of D'Este and Perkmann (2011), who have extensively studied the dynamics of academic-industry collaborations.

For the academic survey, we crafted a set of 8 items specifically designed to capture the nuances of benefits derived from industry collaboration. These items were carefully selected to reflect the different aspects and impacts of such collaborations on academic work.

We employed Principal Component Analysis (PCA) to analyze the responses to these items. The PCA results are presented in Table 3 and revealed two distinct factors. The first factor, which we labeled 'Industry Knowledge', encompasses aspects related to the informational and intellectual gains from industry collaborations. This factor, with a Cronbach's alpha of 0.665, indicates a satisfactory level of internal consistency, suggesting that the items reliably measure the construct.

The second factor, termed 'Industry Resources', reflects the tangible, resource-based benefits obtained from industry partnerships. This includes access to funding, equipment, and other material resources crucial for research and project implementation. The Cronbach's alpha for this factor is 0.766, indicating a strong internal consistency and reliability of the items in measuring this construct.

By distinguishing between these two types of benefits, our study provides a more nuanced understanding of how industry collaborations contribute to the academic sector. The two-factor model not only aligns with the theoretical underpinnings provided by D'Este and Perkmann (2011) but also offers a practical tool for assessing the multifaceted impacts of industry-academic collaborations.

TABLE 4: PCA analysis of Industry collaboration benefits.

ROTATED COMPONENT MATRIX	COMPONENT		COMMUNALITY	MEAN	SD
	1	2			
INDUSTRY KNOWLEDGE					
Feedback from industry on academic research	.826		.724	4.084	.931
Information on industry problem	.786		.641	3.855	.956
Research income from industry	.692		.481	3.656	1.093
INDUSTRY RESOURCES					
Seeking IPR		.889	.807	3.572	1.079
Access to material and/or equipment		.885	.810	4.005	1.070
Eigenvalue	2.329	1.135			
% of Variance	46.58	22.71			
Cumulative % of variance	46.58	69.29			
Chronbach's alpha	0.665	0.766			

NOTE: KMO 0.651, Chi Sq 233.251, df 10, sig 000, N 201

STUDENT SURVEY

Entrepreneurial intentions in the student survey were developed based on Linan and Chen (2009) and adapted from Kolvereid (1996).We used the following 4 statements to measure entrepreneurial intentions among students: (1) "I have very seriously though about starting my own business", (2) "I intend to start a business within five years of graduation", (3) "My professional goal is to start my own business" , (4) "I would rather be self-employed than being employed by someone." The Cronbach alpha was 0.893.

Self-efficacy in the student survey we re-adapted deNoble's scale (1999) and used the following statements to measure ESE: I have… (1) "The right resources to start a business", (2) "The right knowledge to start a business", (3) "The right network to start a business." The Cronbach alpha was 0.823.

INDEPENDENT VARIABLES

ACADEMIC FACULTY SURVEY

We adopted measures of University Context from Oftedal et al. (2018) to create reliable measures for academic faculty. We have three reliable factors, which we labelled University Context Regulative, University Context Cognitive and University Context Normative Dimensions (results of PCA analysis are presented in the table below).

TABLE 5: PCA analysis of University Context Academic Faculty.

ROTATED COMPONENT MATRIX	COMPONENT			COMMUNALITY	MEAN	SD
	1	2	3			
UNIVERSITY CONTEXT REGULATIVE DIMENSION						
Financial support licensing	.926			.883	2.510	1.005
Financial support patenting	.925			.878	2.484	1.010
Financial supporting starting business	.901			.831	2.489	1.020
Management recognition starting business	.855			.854	2.714	1.071
Management recognition patenting	.839			.835	2.704	1.083
Management recognition licensing	.825			.813	2.750	1.101
UNIVERSITY CONTEXT NORMATIVE DIMENSION						
Colleagues respect and admire patenting		.944		.977	3.081	1.044
Colleagues respect and admire licensing		.941		.974	3.086	1.041
Colleagues respect and admire starting business		.931		.957	3.112	1.075
UNIVERSITY CONTEXT COGNITIVE DIMENSION						
I know of and can speak with colleagues who have licensed ideas			.939	.931	2.678	1.147
I know of and can speak with colleagues who have patented ideas			.937	.925	2.724	1.121
I know of and can speak with colleagues who have started business			.918	.882	2.831	1.205
Eigenvalue	6.54	2.49	1.71			
% of Variance	54.52	20.73	14.23			
Cumulative % of variance	54.52	75.26	89.50			
Chronbach's alpha	0.936	0.991	0.951			

NOTE: KMO 0.815, Chi Sq 4372.421, df 66, sig 000, N 196

In addition, we have one factor that we called ***University Context for Industry collaboration***, which was measured by two self-generated questions, which covers (1) "Financial support and management recognition for industry collaboration" and (2) "Awareness of and access to colleagues who have industry collaboration." The Cronbach alpha was 0.890.

STUDENT SURVEY

University context for the student survey was based on the questions from Oftedal et al. (2018). Results of PCA are presented in table below.

TABLE 6: PCA analysis of University Context Students.

	COMPONENT			COMMUNALITY	MEAN	SD
	1	2	3			
UNIVERSITY CONTEXT COGNITIVE DIMENSION						
Fellow students who I know well have the skills to launch a start-up	.796			.675	2.585	1.094
I receive good advice from teaching faculty I deal with to develop my ideas	.778			.659	2.585	1.054
Fellow students who I know well have the right contacts for launching a start-up	.768			.673	2.605	1.103
The teaching faculty I deal with have good knowledge on how to commercialize an idea	.766			.636	2.730	1.081
UNIVERSITY CONTEXT REGULATIVE DIMENSION						
I know of policies that reward students who engage in entrepreneurial activities		.899		.848	2.274	1.203
I know of policies that are responsive to new ideas and innovative approaches.		.876		.809	2.315	1.193
I know of financial support available for students' entrepreneurial activities		.756		.652	2.251	1.223
All students are encouraged to learn more about entrepreneurship		.583		.527	2.503	1.206
UNIVERSITY CONTEXT NORMATIVE DIMENSION						
Starting your own business is a respected career path			.871	.762	3.746	.985
Entrepreneurial initiatives are seen as a "road to success"			.808	.673	3.530	.995
We take pride in students who develop their own ideas			.774	.627	4.015	.956
Eigenvalue	4.471	1.807	1.263			
% of Variance	40.65	16.43	11.47			
Cumulative % of variance	40.65	57.07	68.55			
Chronbach's alpha	0.828	0.849	0.77			

NOTE: KMO 0.813, Chi Sq 2217.191, df 55, sig 000, N 441

CONTROL VARIABLES

ACADEMIC FACULTY SURVEY

A number of control variables were used in this study. We used gender as a dummy variable coded 1 for male and 0 for female, Department was used as categorical variable, Age as ordinal variable, self-employment experience was dummy coded 1 if yes and 0 if no.

We also tried to enter other control variables such as job title, percentage of research that is applied research, whether respondents were permanent or temporary members of faculty, experience of licensing and experience of patenting, but they were not significant and are not included in final regression.

STUDENT SURVEY

Three control variables, gender, work experience and experience of start-up activity, were found to have significant impact on the model. Start-up activity was defined as "pitching competitions, start-up weekend, student start-up competitions etc." This was entered as a dummy coded 1 if yes and 0 if no.

We tried to enter other control variables such as gender, age, master or bachelor students, self-employment experience, role models (1 if yes) but it was not significant and was therefore not included in the final regression.

FINDINGS

ACADEMIC FACULTY SURVEY

In our study, we performed linear regression analyses to examine the influence of University Climate on entrepreneurial intentions and self-efficacy, addressing hypotheses H1.1, H1.2, and H1.3. Interestingly, the analyses revealed that none of the University Climate dimensions emerged as significant predictors of self-efficacy. Consequently, due to the lack of significant findings in this regard, we have chosen not to present these particular results.

However, the regression analysis focusing on the impact of University Climate on entrepreneurial intentions yielded noteworthy results. These findings are methodically displayed in Table 7.

TABLE 7: Linear regression analysis of UC on entrepreneurial intentions.

	ENTREPRENEURIAL INTENTIONS	TOLERANCE
	Model 1 St. Beta	
CONTROLS		
GENDER	.226***	0.909
AGE	-.200**	0.909
DEPARTMENT	.031	0.968
SELF-EMPLOYMENT EXPERIENCE	.374***	0.928
ADJUSTED R^2	**.204**	
F-VALUE	**13.409*** **	
UNIVERSITY CONTEXT REGULATIVE	-.0290	0.735

UNIVERSITY CONTEXT NORMATIVE	-.009	0.692
UNIVERSITY CONTEXT COGNITIVE	.204**	0.792
Δ R^2	**.036**	
ADJUSTED R^2	**.229**	
F-VALUE	**9.209*** **	
N	**n= 195**	

NOTES: † p < 0.1; * p < 0.05; ** p < 0.01; *** p < 0.001.

Our research findings indicate that the cognitive dimension of the University Context is significantly correlated with entrepreneurial intentions among academic employees. In contrast, the regulative and normative dimensions did not demonstrate a significant impact on these outcomes. Consequently, Hypotheses H1.1 and H2.1 are not supported, while H3.1 is validated specifically in relation to entrepreneurial intentions.

Interestingly, our control variables, except for departmental affiliation, were significant. This is an unexpected outcome, particularly in light of previous research (Bercovitz & Feldman, 2008; Clarysse et al., 2011), which has illustrated a higher tendency towards entrepreneurial activities among academics in engineering and science fields compared to their counterparts in other disciplines. One particularly strong predictor of future entrepreneurial intentions was self-employment experience, lending support to the notion that entrepreneurialism tends to be self-reinforcing. Additionally, age emerged as a significant factor, with younger faculty members more inclined towards entrepreneurial intentions. Collectively, the control variables accounted for 20.4% of the variance in entrepreneurial intentions among faculty members.

To evaluate Hypothesis H1.4, which posits that a university context supportive of industry collaboration positively impacts perceived benefits in terms of knowledge and resources, we conducted targeted analysis. Our findings confirmed this hypothesis, indicating that a conducive university environment indeed enhances the perceived benefits of industry collaboration, both in knowledge acquisition and resource accessibility. The detailed results supporting this conclusion are systematically presented in Table 8, showcasing the direct correlation between a supportive university context and the types of perceived industry collaboration benefits.

TABLE 8: Linear regression analysis of UC on industry collaboration benefits.

	INDUSTRY KNOWLEDGE BENEFITS	**TOLERANCE**	**INDUSTRY RESOURCES BENEFITS**	**TOLERANCE**
	Model 1 St. Beta		Model 2 St. Beta	
CONTROLS				
GENDER	-.087	.913	-.182*	.910
AGE	-.030	.928	.057	.923
DEPARTMENT	-.010	.973	-.145**	.973
SELF-EMPLOYMENT. EXPERIENCE	-.062	.930	-.001	.930

ADJUSTED R^2	**-.004**	**.041***
F-VALUE	**.907**	**3.052***
UNIVERSITY CONTEXT TOWARDS IC	**.320*****	**.220****
Δ R^2	**.099*****	**.040***
ADJUSTED R^2	**.094*****	**.067***
F-VALUE	**5.079*****	**2.986****
N	**n=197**	**n=195**

NOTES: † $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Our analysis reveals that a university climate supportive of industry collaboration substantially enhances the perceived benefits of such collaborations, specifically in knowledge acquisition and resource access. This aligns with and expands upon existing literature on the subject (Perkmann et al., 2013; Davey et al., 2016; AL-Tabbaa, 2015).

We found that the perceived knowledge benefits are not just theoretical understandings but also encompass practical, real-world applications and insights into industry-specific challenges. This suggests that when academic institutions foster a climate conducive to industry collaboration, they enable faculty and students to gain a deeper and more practical understanding of their fields.

Similarly, in terms of resource benefits, our findings reveal that supportive university environments significantly enhance access to tangible assets and support from industry partners. These resources extend beyond financial support, encompassing critical assets such as specialized equipment and joint research opportunities, which are essential for advanced research and innovation.

In essence, our study builds upon and extends existing research by providing empirical evidence that a supportive university climate directly influences the extent and nature of the benefits perceived from industry collaboration. This contribution highlights the crucial role that institutional environment plays in maximizing the efficacy and impact of academic-industry partnerships.

STUDENT SURVEY

To test Hypotheses H2.1 to H2.3, which propose that a university environment encouraging entrepreneurship positively influences students' entrepreneurial intentions and self-efficacy, we employed linear regression analysis. The results of this analysis, elucidating the relationship between a supportive entrepreneurial context and its impact on students, are detailed in Table 9.

TABLE 9: Linear regression analysis of UC on intentions and self-efficacy.

	ENTREPRENEURIAL INTENTIONS	TOLERANCE	SELF-EFFICACY	TOLERANCE
	Model 1		Model 2	
	St. Beta		St. Beta	
CONTROLS				
GENDER	.272***	.952	.190***	.952
INVOLVEMENT IN START-UP ACTIVITY	.291***	.960	.272***	.960
WORK EXPERIENCE	.085*	.989	.151**	.989
ADJUSTED R^2	**.188**		**.144**	
F-VALUE	**34.856*** **		**25.691*** **	
UNIVERSITY CONTEXT REGULATIVE	.150**		.208***	
UNIVERSITY CONTEXT COGNITIVE	.029		.151**	
UNIVERSITY CONTEXT NORMATIVE	.118**		-.003	
Δ R^2	**.048**		**.094**	
ADJUSTED R^2	**.231**		**.234**	
F-VALUE	**23.006*** **		**23.389*** **	
N	**n= 441**		**n= 441**	

NOTES: † $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Our analysis uncovers significant insights regarding the relationship between University Context (UC) and its influence on students' entrepreneurial intentions and self-efficacy. The results, which are clearly outlined in the table below, demonstrate a meaningful connection between these elements.

In terms of control variables, they are notably significant, accounting for 18.8% of the variance in entrepreneurial intentions (EI) and 14.4% in self-efficacy. Interestingly, gender appears to play a pivotal role, with male gender showing a strong correlation with both self-efficacy and entrepreneurial intentions. This finding aligns with existing research indicating gender differences in entrepreneurial tendencies.

Moreover, involvement in startup activities emerges as a critical factor, strongly correlated with both self-efficacy and entrepreneurial intentions. This suggests that practical engagement in entrepreneurial ventures significantly boosts confidence and the inclination to pursue entrepreneurial activities.

Delving deeper into the specific dimensions of UC, we observe that the regulative dimension is strongly related to self-efficacy and, to a lesser extent, entrepreneurial intentions. This implies that formal structures and regulations within the university setting may have a more pronounced impact on students' confidence in their entrepreneurial capabilities than on their intentions to engage in entrepreneurship.

Conversely, the cognitive dimension shows a notable relationship with self-efficacy, indicating that shared knowledge and understanding within the university context contribute significantly to students' belief in their entrepreneurial skills. Meanwhile, the normative dimension — encompassing the university's informal values and norms — is closely linked to entrepreneurial intentions. This highlights the importance of the underlying cultural and value-based aspects of the university environment in shaping students' aspirations towards entrepreneurship.

In summary, our findings provide a nuanced understanding of how different facets of the University Context influence key aspects of entrepreneurship among students, underlining the multifaceted nature of these relationships.

To summarize the findings from this study, they are represented in the Table below:

TABLE 10: Perception of University Context in Relation to Entrepreneurial Intentions, Self-efficacy, and Industry Collaboration.

N	GROUP	HYPOTHESES	SUPPORTED (YES/NO)
H1.1	Regulative Structure	Academic faculty's positive perception leads to higher entrepreneurship intentions and self-efficacy.	NO
H1.2	Normative Structure	Academic faculty's positive perception leads to higher entrepreneurship intentions and self-efficacy.	NO
H1.3	Cognitive Structure	Academic faculty's positive perception leads to higher entrepreneurship intentions and self-efficacy.	YES
H1.4	University Context on Industry Collaboration (combined regulative, normative, and cognitive structures)	Academic faculty's positive perception leads to higher industry collaboration involvement.	YES
H2.1	Regulative Structure	Students' positive perception leads to higher entrepreneurship intentions and self-efficacy.	YES
H2.2	Normative Structure	Students' positive perception leads to higher entrepreneurship intentions and self-efficacy.	YES
H2.3	Cognitive Structure	Students' positive perception leads to higher entrepreneurship intentions and self-efficacy.	YES

Our study's analysis of the University Context and its impact on entrepreneurial intentions and self-efficacy yielded intriguing findings. For academic faculty, the hypotheses surrounding the regulative (H1.1) and normative (H1.2) structures did not find support; these dimensions did not significantly influence faculty's entrepreneurship intentions or self-efficacy. However, the cognitive structure (H1.3) showed a positive impact, affirming that faculty's perception of the cognitive environment does lead to higher entrepreneurial intentions and self-efficacy.

Additionally, the combined effect of regulative, normative, and cognitive structures on industry collaboration (H1.4) was supported, indicating that a favorable university context enhances faculty's involvement in industry collaboration.

In contrast, for students, all tested hypotheses (H2.1, H2.2, H2.3) regarding the regulative, normative, and cognitive structures were supported. This demonstrates that students' positive perceptions of these university context dimensions significantly boost their entrepreneurial intentions and self-efficacy.

These results highlight a clear differentiation in how the university context influences faculty and students. While cognitive aspects play a crucial role in shaping faculty's entrepreneurial mindset, all three dimensions of the university context (regulative, normative, and cognitive) equally influence students' entrepreneurial aspirations and confidence.

DISCUSSION

This study sheds light on the multifaceted ways the university context shapes the entrepreneurial landscape for employees and students. Our findings resonate with Oftedal et al. (2018), indicating that the university's regulative, normative, and cognitive structures significantly influence students' entrepreneurial intentions and self-efficacy. This observation is particularly relevant as students are at a formative stage in their career development, where their values and norms are evolving. Universities have a unique opportunity to mold these entrepreneurial inclinations through supportive regulations, reward systems, and comprehensive entrepreneurial education. Highlighting success stories in the media can also play a vital role in shaping a positive entrepreneurial image, thereby motivating students further.

Our study uncovers a striking contrast between students and faculty; the cognitive aspect of the University Context predominantly influences faculty's entrepreneurial intentions. This finding underscores the importance of cognitive factors in nurturing entrepreneurial mindsets among faculty, as outlined by Scott (2014). The cognitive dimension, encompassing the collective understanding and interpretation of social realities in academic settings, is pivotal in entrepreneurial universities. It shapes how faculty members perceive and internalize entrepreneurship-related concepts. Supporting this, research by Fayolle & Redford (2014) and Klofsten et al. (2019) shows that an entrepreneurship-supportive university environment boosts faculty and student participation in entrepreneurial activities.

Furthermore, our research aligns with Siegel & Wright (2015) and Grimaldi et al. (2011) in demonstrating the significant role of cognitive orientation towards entrepreneurship in universities. This orientation not only aids effective technology transfer but also facilitates the formation of successful spin-off companies. However, our findings indicate that the regulative and normative dimensions of the university climate have a minimal impact on faculty's entrepreneurial activities. This could be attributed to the faculty's dedication to their academic roles, where the values of academic research often diverge from entrepreneurial pursuits. This divergence poses a policy challenge, as our study reveals that academic staff primarily view the university's role as a center for cutting-edge research and quality education, not necessarily for commercialization of innovations.

This trend points to a potential conflict of interest for academic faculty in commercialization activities, echoing concerns raised by Gibb and Hannon (2006) and Rasmussen et al. (2006). The advancement of academic careers, often reliant on the open dissemination of knowledge, contrasts with the exclusive knowledge distribution needed for commercial success. Therefore, a targeted approach, focusing resources on academics with a positive disposition towards commercialization activities, could be more effective. This strategy is consistent with findings from Oosterbeek et al. (2010), suggesting that elective entrepreneurial courses, as opposed to mandatory ones, are more likely to foster entrepreneurial intentions among motivated students.

Interestingly, despite commercialization activities not being a primary focus for academic faculty, our survey shows significant engagement in industry collaboration, indicating that academics view such collaborations as an integral part of their professional activities. This observation aligns with D'Este & Perkmann's (2011) findings, highlighting the academia-industry collaboration as a conduit for knowledge expansion and access to research funding. This trend suggests that fostering industry collaboration is a strategic move for universities, as it not only enables knowledge exchange but also enhances knowledge spillover and transfer opportunities. Such collaborations serve the dual purpose of advancing academic objectives and contributing to practical applications of research findings.

Finally, our study outlines the influence of gender on entrepreneurial intentions. These findings corroborate with research by De Bruin et al. (2006) and Iakovleva & Kickul (2011), which highlights gender gap as a critical area for policy intervention. Addressing gender disparities in entrepreneurship is essential for cultivating a diverse and inclusive entrepreneurial ecosystem. Furthermore, the significance of prior startup experience in shaping entrepreneurial intentions and self-efficacy, as supported by Linan & Chen (2009), Hsu (2007), and Ucbasaran et al. (2006), underscores the importance of practical exposure in entrepreneurial education.

CONCLUSION

Our study marks a significant advancement in the theory of entrepreneurial universities. We have introduced a novel approach to understanding the University Context (UC) and its influence on entrepreneurial intentions, both among students and academic faculty. The development and validation of a theory-based UC scale represent a key theoretical contribution. This scale, tailored for diverse academic groups, provides a more comprehensive and nuanced measure of UC than previously available in the literature.

Our findings challenge and extend existing theoretical frameworks on entrepreneurial universities. By moving beyond the conventional focus on business students, our study enriches the discourse on entrepreneurial self-efficacy and intentions across various academic disciplines. This broader perspective offers a deeper understanding of how entrepreneurial intentions are shaped within university settings, contributing to the field's theoretical diversity and richness.

A notable theoretical contribution of this research is the nuanced understanding of the relationship between university context and entrepreneurial activities. The discovery that faculty's engagement in industry collaboration surpasses their involvement in commercialization activities provides a new perspective on the entrepreneurial roles within academia. This insight adds complexity to the theory of entrepreneurial universities, suggesting that these institutions play a multifaceted role in fostering entrepreneurship that goes beyond traditional commercialization activities.

Our research in the Norwegian public university context brings unique insights into the interplay between local conditions and entrepreneurial activities in academic settings. These findings contribute to the theoretical understanding of how external factors like governmental policies, cultural norms, and economic conditions shape entrepreneurial dynamics in universities, adding a valuable dimension to existing theories.

In summary, our study significantly enriches the theoretical landscape of entrepreneurial universities by offering new insights into the diverse pathways of entrepreneurship in academic settings. It underscores the need for theoretical models to account for the varied and complex nature of entrepreneurship in universities, aligning with broader societal and economic objectives. This study not only contributes to the academic understanding of entrepreneurship in higher education but also provides a foundation for future research to build upon and expand.

FUTURE RESEARCH

This study, set within Norway's unique public university context, highlights the influence of specific national and institutional factors on the entrepreneurial climate in higher education. The distinct combination of governmental support, cultural norms, and economic conditions in Norway provides a backdrop that shapes industry collaboration and entrepreneurship. This context underscores the need for comparative research across different countries and university types to understand how various environments impact entrepreneurial dynamics in academic settings.

Future research should employ longitudinal designs to track the evolution of entrepreneurial attitudes and activities over time. Such studies would offer insights into the effects of changing university policies, economic shifts, and societal attitudes on the entrepreneurial ecosystem within universities. Exploring how University Context affects

different academic roles across cultures would provide a more nuanced understanding of academic entrepreneurship.

Additionally, there is a need to investigate effective strategies for fostering university-industry collaborations, focusing on balancing academic research and practical application. This includes studying the role of students in linking academia and industry, as well as aligning academic and entrepreneurial values to avoid potential conflicts.

In essence, future studies should build on our findings to delve deeper into the complexities of academic entrepreneurship in various contexts. This research will enhance our theoretical understanding and offer practical insights for fostering a robust entrepreneurial culture in educational institutions

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ACCOUNTING AND MANAGEMENT CONTROL IN E-COMMERCE: THE STATE OF THE ART AND RESEARCH OPPORTUNITIES

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ABSTRACT

This work aims to analyse the state of the art of accounting and management control practices in companies that follow an e-commerce strategy. The methodology comprises a systematic literature review of the scientific production, from 2000 to 2023, in the Web of Science database. Using bibliometric techniques, temporal evolution and prominent authors, institutions, journals, and countries were identified, and the citation network was analysed. This research also analyses the structural knowledge groups and the scientific production specifically focused on accounting and e-commerce. Eighty-nine articles were analysed, most published between 2019 and 2023, with 2022 being the most evident and notable year in the number of articles published. The analysis shows that relatively few studies published in the last two decades focused on the importance of accounting and e-commerce, with a growing trend in recent years. The increased interest in studying the importance of e-commerce can be explained by the strategic role of a company in becoming innovative and more efficient and, on the other hand, the global pandemic experienced three years ago forced companies to adjust their business model. The keywords most used in the analysed studies align with this assumption. This document provides support and guidance for new researchers on this topic.

KEYWORDS: Accounting; Competitive Environment; Digital Trends; E-commerce; Management.

1. INTRODUCTION

The speed with which technology progresses in today's world imposes a new reality on economies, making technology platforms a vital means of disseminating knowledge and a channel for economic transactions, where companies and consumers reinvent business practices. For Ferrera and Kessedjian (2019), the new information technologies evolution, mainly the Internet (Laudon & Travel, 2017), has transformed businesses worldwide, providing the significant development of e-commerce and the global economy. Indeed, as stated by Bonzanini et al. (2020:1), the progress of Information and Communication Technology (ICT) "has dramatically transformed economic activity". Moreover, the development of e-commerce has been facilitated by the use of smartphones, which are readily available at a lower cost compared to a few years ago and therefore increased the popularity of online shopping (Oláh *et al*., 2018). According to Simakov (2020), e-commerce is a specific form of innovative entrepreneurship that has gained significant benefits in goods trade due to the Internet's great potential.

However, from the perspective of Andonov and Dimitrov (2021), organisations can use technology not only to reach a larger target audience but also to increase the effectiveness and efficiency of work to acquire a good market position and image. According to Kwilinski (2019), scientific and technological progress was the impetus for new business methods aimed primarily at satisfying consumer needs, including monopolising sales markets, global competition, and the active development of information technologies. Oláh *et al*. (2018) argue that environmental,

social, and economic aspects are significant for the e-commerce sector, both for the producer and the consumer, allowing a company to build lasting customer relationships. Consumers are increasingly aware of environmental issues, so they call on companies to adopt green and sustainable solutions. With the Internet, companies can enter new markets and lead internationalisation, reaching customers worldwide (Andonov & Dimitrov, 2021).

Internet use has been transforming how an individual sees purchasing goods and services. This digital trend creates a more autonomous, intelligent, demanding, and informed consumer. Over the last decade, ICT has become more available to the public, both in terms of accessibility and cost. A turning point was reached in 2007, when the majority (55 %) of households in the EU-27 had access to the Internet. This share continued to grow, reaching 73 % in 2011, an increase of 3 percentage points compared to 2010 (Eurostat, 2015).

For Laudon and Travel (2017), e-commerce is inseparable from Internet technology. With the Internet, e-commerce is present virtually. However, for these authors, e-commerce is more than just business and technology. The third equation part for understanding e-commerce is society. E-commerce and the Internet have critical societal consequences that business leaders can ignore only at their peril. E-commerce has challenged our concepts of privacy, intellectual property, and even our ideas about national sovereignty and governance. Thus, e-commerce has been and continues to be an area where innovations are actively implemented and disseminated, so it is not only a form of innovative entrepreneurship but also an environment for testing and implementing innovations that promote e-commerce and innovative entrepreneurship in general (Simakov, 2020).

The relationship between e-commerce and accounting still needs to be clarified in the literature (e.g., Leyshon et al., 2005; Ahmad, 2013; Atanassova, 2018). So, this study aims to analyse the state of the art of accounting and management control practices in companies that follow an e-commerce strategy. The methodology comprises a systematic literature review from the Web of Science database. This article is organised into four sections. After the introduction, the second section describes the methodological procedures. The third section presents and discusses the bibliometric analysis. Finally, the main conclusions of the study, as well as its contribution and limitations, are drawn.

2. METHODOLOGY

Bibliometrics is a statistical tool for managing information regarding scientific and technological knowledge. Therefore, it can be defined as a set of empirical rules and principles that contribute to establishing the theoretical foundations of Information Science, based on quantitative processes of analyses scientific documents (Guedes & Borschiver, 2005). In this follow-up, Costa *et al.* (2012) define bibliometrics as a quantitative technique to measure knowledge production and dissemination indices, aiming to produce and monitor the development of different scientific fields, the patterns of authorship and publication, and the use of research results.

This type of analysis allows for exploring, generating, mapping, organising, and evaluating the scientific production of a given topic of study through bibliometric indicators for the research relevance and importance (Guedes & Borschiver, 2005). The scientific production evaluation is done through bibliometric indicators divided into Indicators of scientific quality (based on the perception of peers who evaluate publications by content), Indicators of scientific activity (allowing to record the scientific activity developed, namely the number of published works, the authors' productivity, the number of references between works and authors, among others); Indicators of scientific impact (measure the number of citations received, the impact factor of journals, the citation index and the influence of journals); and thematic associations indicators (for example, the citations and the references cited analysis) (Costa *et al.,* 2012).

Given the relevance of assessing journals' and authors' productivity, and identifying the most frequent keywords, it is necessary to consider the bibliometric laws, namely Bradford's Law (its focus is on the productivity of journals, i.e.,

identifying the most relevant journals in a given area of knowledge); Lotka's Law (the objective is in studying the degree of relevance and impact of authors in a specific topic); and Zipf's Laws (observes the automatic indexing of scientific and technological articles) (Guedes & Borschiver, 2005).

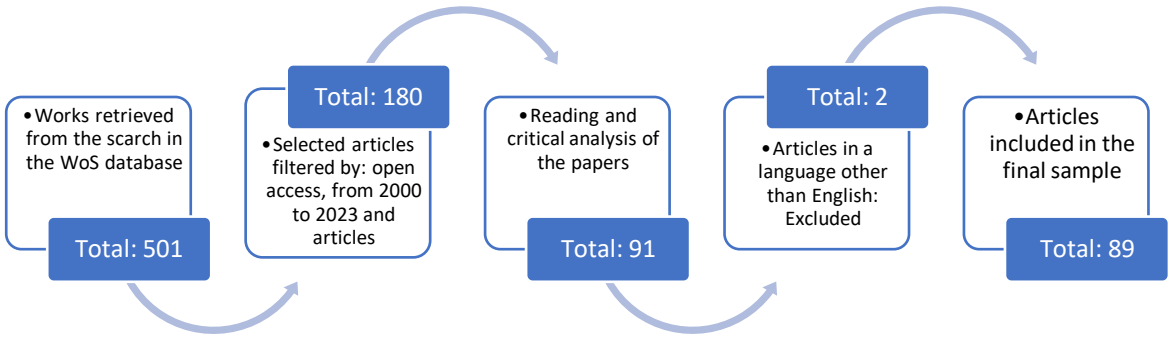
To conduct the document selection, the following research criteria were applied:

1. The articles were collected from the Web of Science.
2. The search included documents from 2000 to 2023 to analyse the most recent research.
3. The research focused on journal articles, rejecting other documents.
4. No filter was applied regarding the field of knowledge.
5. Only English articles were accepted.

The first search try was conducted on March 18, 2023. It was an advanced search (title, keywords, and abstract) with the combination of the following words: "management accounting" AND "e-commerce". Only a few results were generated since the search was done in quotes. Thus, it was decided to redefine the search, using the same words without quotes, resulting in 180 articles. These data were exported to a Microsoft Office Excel file. Then, the title and abstract of each of the 180 articles were read to check whether they addressed the research topic, which covers articles published in e-commerce related to accounting and management.

Finally, only 91 articles were identified as closely resembling the topic. However, two articles were excluded because they were not written in English (they were written in Russian and Ukrainian). Consequently, the final sample consisted of 89 articles (Figure 1).

FIGURE 1: The search process.



SOURCE: Developed by the author.

In this research, the four main bibliometric methods were used: citation analysis (number of times items cite each other), co-occurrence (number of documents that occur together), bibliographic coupling (number of references they share), and co-citation (number of times documents are cited together). Specifically, this study analyses scientific production by year, author, country/region, and organisations, as well as the most used keywords, as well as the most used keywords in the research topic, followed by an analysis of the most cited publications, authors, countries/regions, and organisations. This bibliometric analysis also includes Structural Knowledge Groups based on

the highest total link strength. At the beginning of this research, the objective was to analyse scientific production focused on e-commerce and management accounting. However, given the scarcity of research developed within the scope of these research topics, it was decided to extend the analysis to bibliography centred on accounting, management, and e-commerce. It was considered pertinent to analyse scientific production in accounting and e-commerce (12 in 89 papers).

Once the final sample was obtained, we analysed the data using VOSviewer software, specifically version 1.6.19. It was created by Nees Jan van Eck and Ludo Waltman CWTS Leiden University, Leiden, The Netherlands, aiming to create maps "based on network data and for visualising and exploring these maps" (Smyrnova-Trybulska et al., 2018, p. 381). This visualisation software package was adopted due to its powerful tool capable of generating maps to describe the links between each unit of analysis (Oliveira & Waltman, 2012).

Although other tools can be used to conduct bibliometric literature reviews (e.g., PRISMA-statement, SciMAT, Bibexcel, and Publish or Perish), VOSviewer was chosen because it has been widely used in previous studies and also because it presents an organised interface for visualising bibliometric networks (da Conceição Moreira *et al.,* 2020).

3. PRESENTATION AND DISCUSSION OF RESULTS

3.1. SCIENTIFIC PRODUCTION

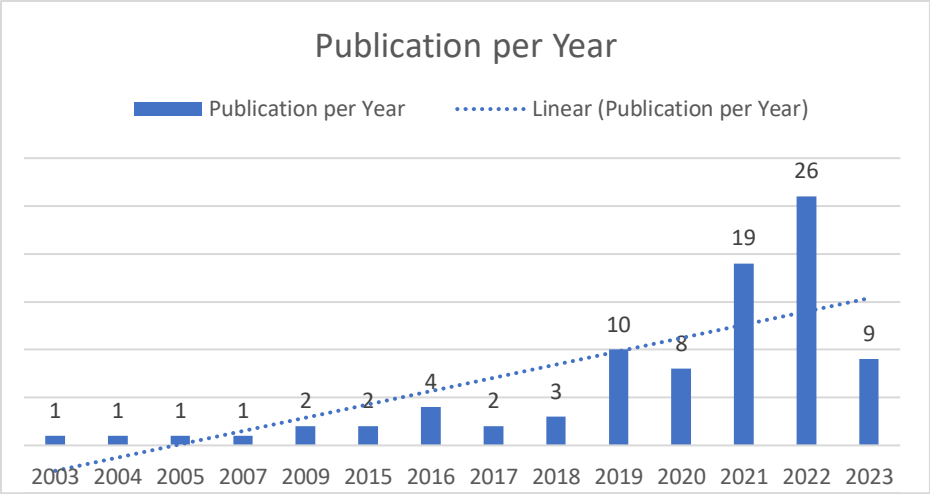
3.1.1. EVOLUTION OF SCIENTIFIC PRODUCTION

e-commerce had a visible growth during COVID-19. The closure of physical shops forced companies to create online shops. As we can see in Graph 1, it was only in 2019 that this topic began to gain momentum in the literature. This evidence confirms that, in the last four years, the role of e-commerce in companies has been promoted as a critical factor in fulfilling their objectives.

The first paper on the topic was published in 2003 by Ogasawara, Y, in JSME International Journal Series C-mechanical Systems Machine Elements and Manufacturing. Ogasawara's (2003:9) paper, entitled "E-commerce and business models—(Business design capability becomes much more critical)", alerts us "to the trend of technological development, highlighting the need to take a macro look at the meaning of the concept of business models, something that has become viewed in the 'micro' as patent-related issues".

Graph 1 shows the chronological evolution of publications relating to e-commerce, accounting, and management themes from 2000 to 2023. This research topic has been gaining ground among researchers. However, until 2007, only an average of 1 article was published per year. Between 2009 and 2018, there was an irregular trend in publishing, with a maximum of four publications in 2016. As can be seen, the number of research on the topic increased significantly from 2019. Most of the articles were published in the last three years, precisely 54, so this topic's trend is increasing. In fact, since 2021 there has been an increasing trend, with 2022 standing out as the year with the most publications. As the data analysed includes publications until March 18, 2023, the number of publications in 2023 is expected to exceed that obtained in 2022.

GRAPH 1: Time evolution of scientific production.



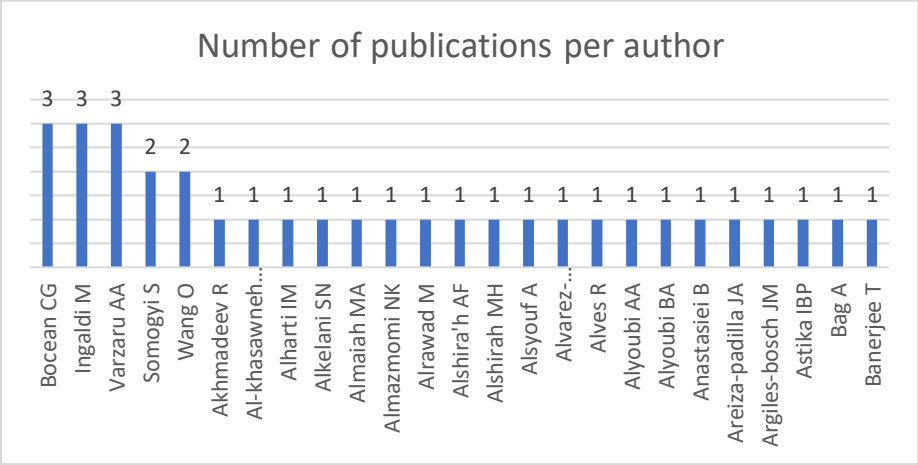
SOURCE: WoS database.

3.1.2. PUBLICATIONS PER AUTHOR

Regarding the number of publications per journal, the results showed that 60 journals published articles specifically on research topics. Sustainability (SCIE; SSCI) is the journal with the highest number of publications in the period studied, with nine articles, followed by the second and third journal, which is Mobile Information Systems (SCIE) and Electronics (SCIE), with four articles each, and the Journal of Theoretical and Applied Electronic Commerce Research (SSCI), IEEE Access (SCIE) and Baltic Journal of Economic Studies (ESCI), with three articles each. Nine journals have two publications, while the remaining 45 have only one.

In total, 266 authors were identified. The authors with the most publications are Bocean CG (3 articles), Ingaldi M (3 articles), and Varzaru AA (3 articles). Four authors have two publications, while the remaining authors have published only one article. As shown in Graph 2, it is evident that most of the authors (about 85%) have published only one article on the research topic.

GRAPH 2: Distribution of publications based on the number of author(s).



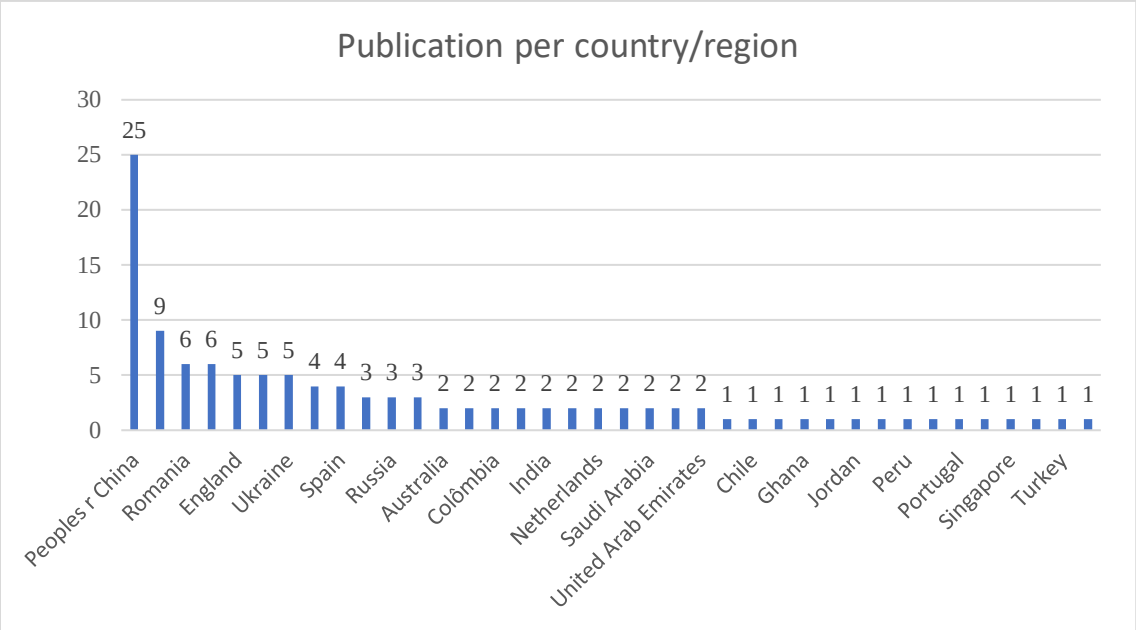
SOURCE: WoS database.

In addition, this research reveals that the number of single-authored articles is significantly lower than the number of articles produced by multiple authors.

3.1.3. PUBLICATIONS BY COUNTRY/REGION

Graph 3 shows the countries/regions with more than two publications in the timeline under study. Of 38 countries/regions with publications on the research topic, the People's Republic of China has the most publications in the area, with 25 publications. The second most published is Poland, with nine publications; Romania and Taiwan, with six; and England, Malaysia, and Ukraine, with five each. All other countries have less than four publications at the time of this research. In total, there are 15 countries with one publication. Most of the published studies on e-commerce (related with accounting and management areas) are concentrated in a developing country (China). The second country with the most publications is developed with an advanced economy and high living standards. However, the fact that the countries with the highest number of publications on research topics are developing countries (Taiwan and Malaysia, among others) may indicate a growing concern to transform companies' business models by adopting e-commerce for its numerous benefits. Plausible advantages could be that selling the product online will be available for purchase at any time of the day, every day of the week. This significantly increases sales and results, access to more customers, expansion into new markets, better position compared to the competition, and reduced costs for the business.

GRAPH 3: Publications by country/region.

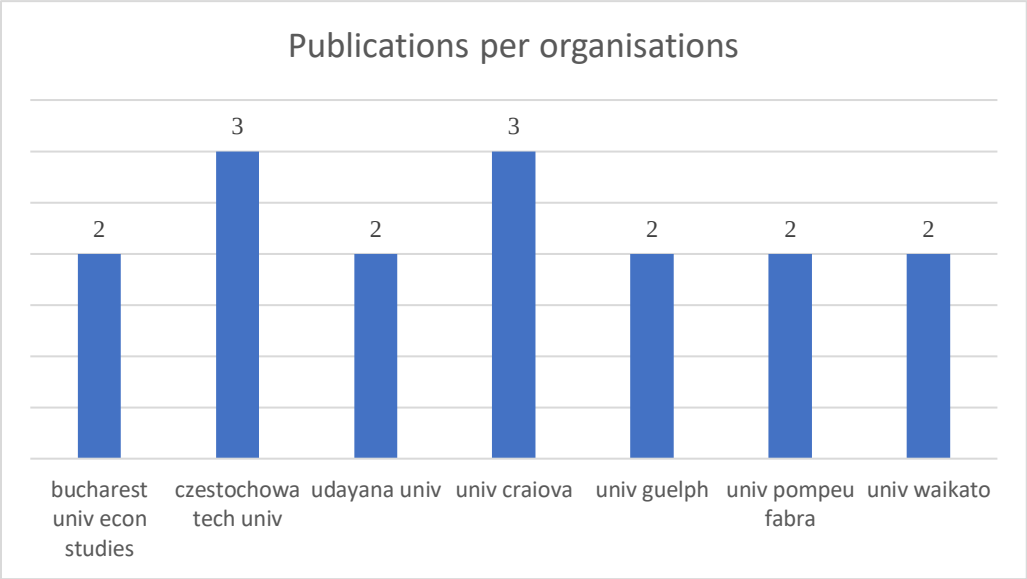


SOURCE: WoS database and VOSviewer.

3.1.4. PUBLICATIONS PER ORGANISATIONS

Of 178 organisations with publications on the research topic, the Częstochowa University of Technology (Poland) and the University Craiova (Romania) stand out with three publications in the timeline under study. This is followed by another five organisations with two publications, as shown in Graph 4 below. The remaining 171 organisations published only one article in the research area.

GRAPH 4: Organisations with more than two publications.



SOURCE: WoS database and VOSviewer.

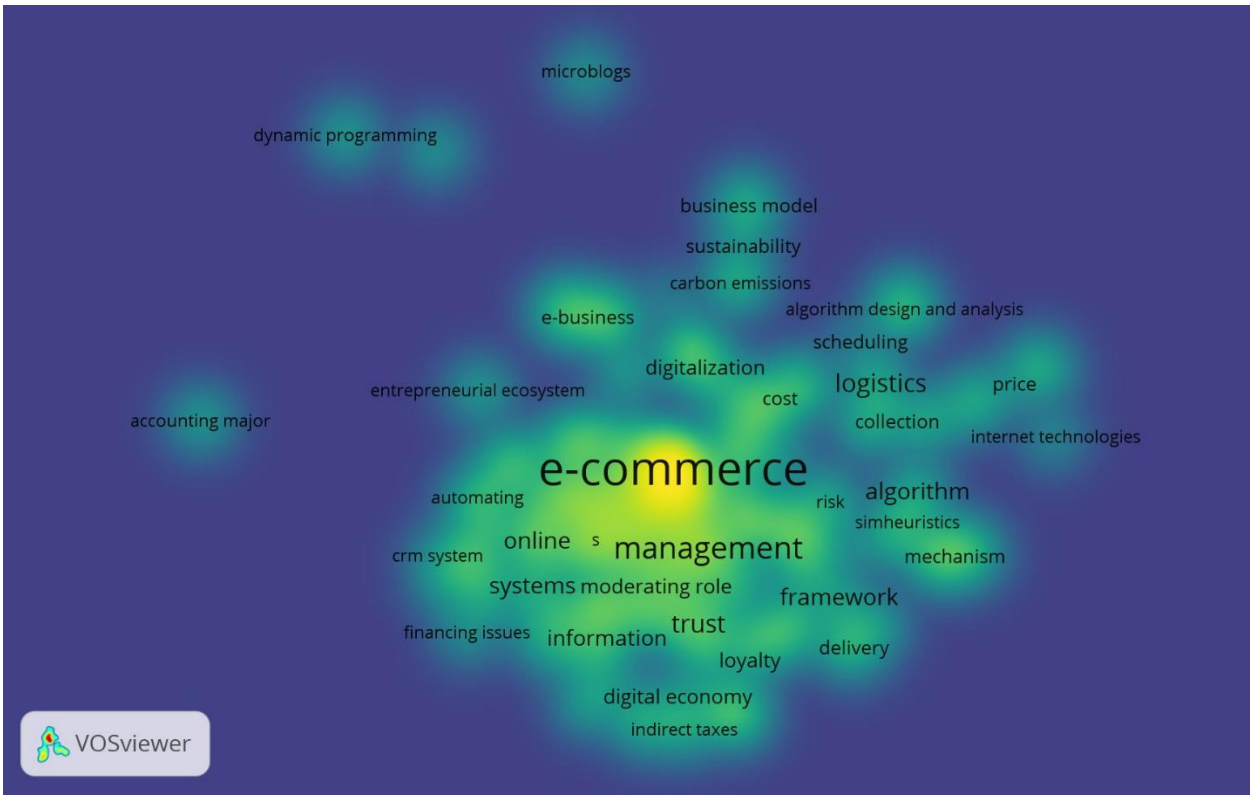
3.1.5. MOST USED KEYWORDS

Graph 5 shows the frequency of the main keywords based on co-occurrence analysis. A minimum number of occurrences of a keyword (1) was established, resulting in a sample with 573 keywords.

After analysing the total occurrence of the keywords, it is concluded that the most used keywords were "e-commerce", "Management", "E-business", "Digital Economy", "Logistics", "Business Model", "Online", and "Sustainability", as shown in Graph 5. These keywords fulfil the research themes, representing e-commerce research trends.

Notably, "e-commerce" has 52 occurrences (total link strength: 495) since it constitutes a key point of the articles under analysis. This is followed by "impact" and "management" with 14 occurrences.

GRAPH 5: The most used keywords (visualisation by density).



SOURCE: WoS database and VOSviewer.

3.2. MOST CITED PUBLICATIONS, SOURCES, AUTHORS, COUNTRIES/REGIONS AND ORGANISATIONS

Table 1 presents the TOP 10 most cited articles published on the research topic. The most cited article, with 809 citations, was published by Zhu, K and Kraemer, K. L., titled "Post-adoption variations in usage and value of e-business by organisations: Cross-country evidence from the retail industry". This work was published by Information Systems Research in 2005. In this paper, the authors analyse whether e-business usage and value are influenced by economic environments (technological, organisational, and environmental factors) and compare the results of the two sub-samples from developed and developing countries. The authors concluded that (1) "technology competence, firm size, financial commitment, competitive pressure, and regulatory support are important antecedents of e-business use"; (2) "both front-end and back-end capabilities contribute to e-business value and that back-end integration has a much stronger impact" (p. 61).

In second place, with 162 citations, is the article by Walczuch and Lundgren, published in 2004. The study emphasises the importance of trust in e-commerce from the perspective of consumers, identifying five groups of factors: personality, perception, attitude, experience, and knowledge. According to Walczuch and Lundgren (2004), these categories are determinants for consumer trust in e-commerce companies; however, perception-based factors are the main determinants in this variable.

The third most cited article, with 117 citations, entitled "Connecting Social Media to e-commerce: Cold-Start Product Recommendation Using Microblogging Information", belongs to authors Zhao, W. X., Li, S., He, Y., Chang, E. Y., Wen, J. R., & Li, X. (2016). In the study, authors "propose a novel solution for cross-site cold-start product recommendation, which aims to recommend products from e-commerce Web sites to users at social networking sites in 'cold-start' situations, a problem which has rarely been addressed explored before" (p. 1147).

With 69 citations, in fourth place, is the article by Ruan and Durresi (2016): "A survey of trust management systems for online social communities—Trust modelling, trust inference and attacks". The study investigated existing trust management systems for online social communities.

In fifth place is the article by Wang and Somogyi (2018), with 52 citations. The authors explored the impact of innovation adoption on the implementation of online food shopping by Chinese consumers. In addition, they examined consumers' online shopping preferences by specific food categories and the segments of consumers who buy food online in China.

In sixth place is the study by Wang, Somogyi, and Charlebois (2020), with 50 citations. The objective of this research was to evaluate four e-commerce modalities: business-to-consumer (B2C), online-to-offline delivery (O2O Delivery), online-to-offline in-store (O2O In-store) and New Retail.

The article by Pagès-Bernaus, Ramalhinho, and Calvet (2019) is in seventh place, with 48 citations and studies the e-commerce activity and how it has evolved in recent years.

The article "Perceived Risk Factors Affecting Consumers Online Shopping Behaviour" is in eighth place, with 44 citations. This study was developed by Wai, Dastane, Johari, and Ismail (2019) and examines the impact of financial, convenience, non-delivery, return policy, and product risks on Malaysian online consumer behaviour.

Ingaldi and Ulewiez's (2019) research, with 34 citations, aims to explore what standards online shops will need to meet to succeed and adapt to changing customer demands based on the Kano model and customer satisfaction.

Finally, in tenth place, with 32 citations, is the article "Efficiency-centered, innovation-enabling business models of high-tech SMEs: Evidence from Hong Kong". The authors, Loon and Chik (2019), explore how small and medium-sized enterprises must innovate to differentiate themselves from their competitors, assessing their competencies around technology and innovation practices to become more effective and efficient.

The publications identified above have more than 30 citations. The remaining articles have 30 or fewer citations. It is important to note that In the TOP 10, no articles focus on e-commerce and accounting.

TABLE 1: TOP 10 articles with the most citations.

RO	AUTHOR(S)	YEAR	TITLE	TC
1	Zhu, K., & Kraemer, K. L.	2005	Post-adoption variations in usage and value of e-business by organisations: Cross-country evidence from the retail industry	809
2	Walczuch, R., & Lundgren, H.	2004	Psychological antecedents of institution-based consumer trust in E-retailing	162
3	Zhao, W. X., Li, S., He, Y., Chang, E. Y., Wen, J. R., & Li, X.	2016	Connecting Social Media to e-commerce: Cold-Start Product Recommendation Using Microblogging Information	117
4	Ruan, Y., & Durresi, A.	2016	A survey of trust management systems for online social communities—Trust modelling, trust inference and attacks	69
5	Wang, O., & Somogyi, S.	2018	Consumer adoption of online food shopping in China	52

6	Wang, O., Somogyi, S., & Charlebois, S.	2020	Food choice in the e-commerce era A comparison between business-to-consumer (B2C), online-to-offline (O2O) and new retail	50
7	Pagès-Bernaus, A., Ramalhinho, H., Juan, A. A., & Calvet, L.	2019	Designing e-commerce supply chains: a stochastic facility-location approach	48
8	Wai, K., Dastane, D. O., Johari, Z., & Ismail, N. B.	2019	Perceived Risk Factors Affecting Consumers' Online Shopping Behaviour	44
9	Ingaldi, M., & Ulewicz, R.	2019	How to Make e-commerce More Successful by Use of Kano's Model to Assess Customer Satisfaction in Terms of Sustainable Development	34
10	Mark Loon and Roy Chik.	2019	Efficiency-centred, innovation-enabling business models of high-tech SMEs: Evidence from Hong Kong	32

LEGEND: RO: Ranking Order; TC: Total Citations.

SOURCE: WoS database and VOSviewer.

Table 2 shows the ten most cited journals, authors, organisations, and countries/regions. According to Table 2, the most cited authors are Kraemer, K. L. and Zhu, K., with 809 citations. They are the authors of the most cited article, "Post-adoption Variations in usage and value of e-business by organisations: Cross-country evidence from the retail industry", published in 2005 in the most cited journal, Information systems research", with only one publication. Associated with the same authors is the University of California Irvine, the most cited organisation and the most cited region. Also, most publications in the area are in the USA, with 884 citations.

Next, the journals with the highest number of citations are "Information & Management", with 162 citations; "IEEE transactions on knowledge and data engineering", with 117 citations; "British food journal", with 102 citations; "Sustainability", with 71 citations; "Knowledge-based systems", with 69 citations; "International transactions in operational research", with 48 citations; "Journal of Asian finance economics and business", with 47 citations; "Asia pacific journal of management"; and "European journal of operation research", with 30 citations. The remaining journals have less than 30 citations (between 2 and 14).

Following the most cited are Lundgren H and Walczuch R, with 162 citations, authors of the second most cited article named "Psychological antecedents of institution-based consumer trust in e-retailing" and Zhao Wayne Xin, Li Sui, He Yulan, Chang Edward Y, Wen Ji-Rong, and Li Xiaoming, with 117 citations, authors of the third most cited article named "Connecting Social Media to e-commerce: Cold-Start Product Recommendation Using Microblogging Information".

It should be noted that although China has the highest number of published articles on research public (n = 25), the USA has a higher number of cited articles (n = 884). Moreover, although Netherlands and New Zealand are not among the countries with many publications, the two articles produced in each country were highly cited. On the other hand, despite the relatively high number of publications on e-commerce in some developing countries, such as Ukraine (5 articles) and Indonesia (3 articles), the number of citations from these countries received is not significant. One reason that explains this issue is that most of the articles from these countries were published in lower research impact journals (ESCI), which also contributed to the small number of citations they received.

TABLE 2: Top 10 most cited journals, authors, organisations, and countries/regions.

RO	SOURCES	TC	AUTHORS	TC	ORGANISATIONS	TC	COUNTRY/REGION	TC
1	Information systems research	809	Kraemer, KL	809	University of California Irvine	809	USA	884
2	Information & management	162	Zhu, K	809	University Maastricht	162	England	225
3	IEEE transactions on knowledge and data engineering	117	Lundgren, H	162	University Aston	117	China	211
4	British food journal	102	Walczuch, R	162	Highland Theological College	117	Netherlands	176
5	Sustainability	71	Zhao, Wayne Xin	117	University Peking	117	Taiwan	155
6	Knowledge-based systems	69	Li, Sui	117	Renmin University of China	117	Canada	117
7	International transactions in operational research	48	He, Yulan	117	University of Guelph	102	New Zealand	102
8	Journal of Asian finance economics and business	47	Chang, Edward Y	117	University of Waikato	102	Malaysia	69
9	Asia pacific journal of management	32	Wen, Ji-Rong	117	Indiana University and Purdue University	69	Poland	57
10	European journal of operational research	30	Li Xiaoming	117	University Dalhouise	50	Spain	56

LEGEND: RO: Ranking Order; TC: Total Citations.

SOURCE: VOSviewer.

3.3. STRUCTURAL KNOWLEDGE GROUPS

The Top 10 references cited with the highest total link strength (ascending order) are exhibited in Table 3. In a total of 4482 references, the study by Claes Fornell and David F. Larcker entitled "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error" was the most co-cited with a total of 7 citations and 22 of the total link strength, which indicates the number of publications in which two keywords occur together. Fornell and Larcker's study analyses the statistical tests used to analyse structural equation models with unobservable variables and measurement error. This indicates that a significant number of studies in this research area use the Structural Equation Model technique to analyse the relationship between unobserved variables.

In second place, with six citations and 17 total link strength, is the study by DeLone and McLean entitled "Information systems success: The quest for the dependent variable". This study identified 43 specific variables that influenced different dimensions of the information systems success and organised these success factors into five categories based on Leavitt's Diamond of Organizational Change: task characteristics, user characteristics, social characteristics, project characteristics and organisational characteristics.

The third-place article with five citations and 15 total link strength is the paper by William H. Delone and Ephraim R. McLean, entitled "The DeLone and McLean Model of Information Systems Success: A Ten-Year Update". This study aims to analyse research contributions on information systems success, specifically in research efforts that apply, validate, and propose improvements to the original DeLone and McLean model. Based on the contribution

evaluation, refinements to the model were proposed, leading to an updated DeLone and McLean IS success model for measuring e-commerce system success. This model is a framework and a model for measuring the complex dependent variable in information systems research (DeLone & McLean, 2003).

The fourth place, with six citations and 13 total link strengths, belongs to the study by William H. DeLone and Ephraim R. McLean, entitled "Measuring e-commerce success: Applying the DeLone and McLean information systems success model". This publication presented an improved model, which can be adapted to the measurement challenges of the new world of e-commerce. The updated model's six dimensions (system quality, information quality, service quality, usage, user satisfaction, and net benefits) is a parsimonious framework for organising the e-commerce success metrics identified in the literature. With two case examples (a big business of "bricks-and-clicks" of high profile and the other a small, traditional, regional retailer), the authors demonstrate and explain how the model can be used to guide the identification and specification of e-commerce success metrics (DeLone & McLean, 2004). The rest of the articles in the TOP 10 references cited have between 10 and 13 total link strength.

TABLE 3: Top 10 co-cited references with highest total link strength.

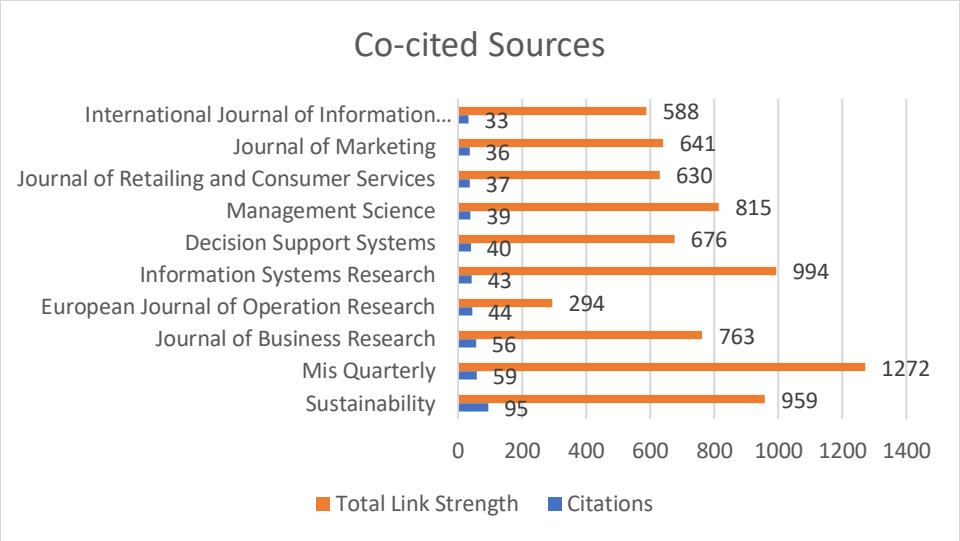
RO	CITED REFERENCE	TC	TLS
1	Fornell, C. and Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, 18(1), 39–50.	7	22
2	DeLone, W. H. & McLean, E. R. (1992). Information Systems Success: The Quest for the Dependent Variable. *Information Systems Research*, 3(1), 60–95.	6	17
3	DeLone, W. H. & McLean, E. R. (2003). The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. *Journal of Management Information Systems*, 19(4), 9–30.	5	15
4	DeLone, W. H. & McLean, E. R. (2004). Measuring e-commerce success: Applying the DeLone & McLean information systems success model. *International Journal of electronic commerce*, 9(1), 31–47.	6	13
5	Venkatesh, V. & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, 46(2), 186–204.	5	13
6	Ajzen, I. (1991). The theory of planned behaviour. *Organisational Behavior and Human Decision Processes*, 50(2), 179–211.	3	13
7	Podsakoff, P. M., MacKenzie, S. B., Lee, J-Y. & Podsakoff, N. P. (2003). Common method biases in behavioural research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879–903.	4	12
8	Podsakoff, P. M. (1986). Self-Reports in Organisational Research: Problems and Prospects. *Journal of Management*, 12(4), 531–544.	3	11
9	Zhu, K., & Kraemer, K. L. (2002). E-commerce metrics for net-enhanced organisations: Assessing the value of e-commerce to firm performance in the manufacturing sector. *Information systems research,* 13(3), 275–295.	3	11
10	Anderson, R. E., & Srinivasan, S. S. (2003). E-satisfaction and e-loyalty: A contingency framework. *Psychology & Marketing*, 20(2), 123–138.	3	10

LEGEND: RO: Ranking Order; TC: Total Citations; TLS: Total Link Strength.

SOURCE: VOSviewer.

Graph 6 represents the most cited journals. Out of 2420 cited journals, the journal that stands out the most is Sustainability, with 95 citations and 959 Total link strength, which indicates the number of publications in which two keywords occur together.

GRAPH 6: Sources co-cited.



SOURCE: VOSviewer.

Finally, out of 3844 co-cited authors, DeLone stands out with 19 citations and 133 total link strength, indicating the number of publications in which two keywords occur together.

The most-cited author, DeLone W. H., holds three most-cited articles. His most cited publications were: (1) "Information Systems Success: The Quest for the Dependent Variable", which aims to identify the factors that contribute to the success of information systems; (2) "Measuring e-commerce success: Applying the DeLone and McLean information systems success model", which analyses the effect of information technology and the Internet on business operations in companies that are making significant investments in e-commerce applications; and (3) "The DeLone and McLean Model of Information Systems Success: A Ten-Year Update", which investigates the research contributions of information systems (IS) success and the usefulness of the updated DeLone and McLean Success Model for measuring e-commerce system success.

The author Venkatesh V. has a publication entitled "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies". This research develops and evaluates a theoretical extension of the Technology Acceptance Model (TAM), which explains perceived usefulness and usage intentions regarding social influence and cognitive instrumental processes (Venkatesh & Davis, 2000).

The cited author Zhu K., with 12 citations, wrote one of the most cited articles: "e-commerce metrics for net-enhanced organisations: Assessing the value of e-commerce to firm performance in the manufacturing sector" with three citations and 11 Total Link Strength. This study developed a set of dimensions (information, transaction, customisation, and supplier linkage) to measure e-commerce capability in organisations with Internet access.

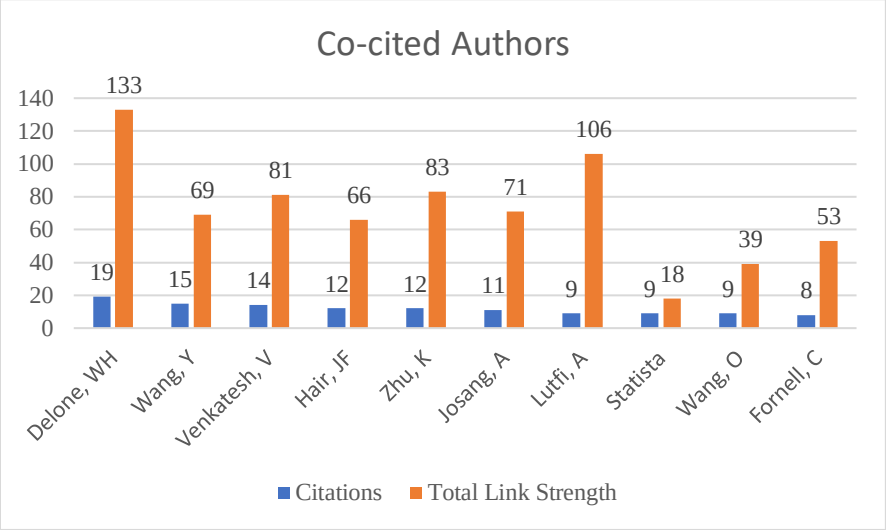
With only eight citations, the most cited author, Fornell wrote the most cited publication, with seven citations, entitled "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error". This research analyses the statistical tests used in structural equation models with unobservable variables and measurement

errors. This author is highly cited because most of the studies analysed apply structural equation modelling as a statistical analysis technique.

Wang Y, Hair, Josang, Lutfi, Statista, and Wang O, in the top 10 most cited references, are also co-cited authors, with citations and total link strength ranging from 18 e 106 citations and 9 and 15 total link strength. In addition, it should be noted that in the sample of 89 articles selected for the study, there are articles written by the most cited authors, Wang Y, Zhu, Lutfi, and Wang O. In particular, Zhu is the most cited author and wrote the article, in co-authorship, with the most citations of the sample under study, entitled "Post-adoption variations in usage and value of e-business by organisations: Cross-country evidence from the retail industry" published in the most cited journal "Information systems research" and in the most cited organisation, the University of California. This study, drawing on the literature on diffusion of innovation and resource-based theory, developed an integrative research model to assess the diffusion and consequence of e-business at the firm level to investigate further whether the usage and value of e-business are influenced by economic environments, by comparing two sub-samples across developed and developing countries (Zhu & Kraemer, 2005). From the sample under study, the article "Influence of Digital Accounting System Usage on SMEs Performance: The Moderating Effect of COVID-19", was written by Lufti (2022) and, aims to explain that accounting information has served as a fundamental basis for business decision-making and its extensive use of digital technology has paved the way for the efficiency and effectiveness of accounting functions (Lutfi *et al.* 2022); and Wang O (2020) developed the article entitled "Food choice in the e-commerce era A comparison between business-to-consumer (B2C), online-to-offline (O2O) and new retail", with the purpose of associating consumers' motivations for food choice and sociodemographic characteristics with their attitudes and consumption towards food purchases in four e-commerce modalities: B2C, O2O Delivery, O2O In-store and New Retail; and "Consumer adoption of online food shopping in China", aiming to explore the impact of innovation characteristics on Chinese consumers' adoption of online food shopping (Wang *et al.* 2020).

Graph 7 highlights the most cited authors.

GRAPH 7: Top 10 co-cited authors.



SOURCE: VOSviewer.

3.4. SCIENTIFIC PRODUCTION ON ACCOUNTING

A detailed analysis of the sample of 89 publications was carried out to identify the articles specifically about the accounting of e-commerce business, resulting in 12 articles.

With the rise of internet use, the study by Shang *et al.* (2022) entitled "Analysis and Application of Enterprise Performance Evaluation of Cross-Border e-commerce Enterprises Based on Deep Learning Model" shows that a new business model based on information and networking technologies has emerged: e-commerce. The authors conducted an experimental analysis of e-commerce companies to measure their performance to "ensure the reliability of data and effectiveness of performance accounting" (p. 1).

The study by Zhou (2023), entitled "Financial model construction of a cross-border e-commerce platform based on machine learning", analyses the financial risks and management problems that CBEC (cross-border e-commerce) platforms face, and therefore, these platforms need adequate supervision and protection against network risks. Artificial intelligence (AI) and machine learning (ML) are used to study the financial operations of CBEC platforms. The cross-border e-commerce (CBEC) financial platform can improve the information security of financial transactions and the accuracy of accounting. In the platform, the introduction of dynamic financial accounting is necessary for the financial management of the platform because, with accounting, the frequency of updating financial statements is reduced, making it easier to change information over time.

The article "Analysis on the strategy of improving management consulting business performance: Evidence on a management consulting company established by an accounting firm", written by Lee (2021), discusses the main factors affecting management consulting business performance. Three regression models were developed to analyse business performance from the perspective of accounting firms and consulting firms. The research concludes that accounting firms should be encouraged to embrace e-commerce and digitalisation, including hardware/software upgrades, the deployment of invoicing programs and the adoption of auditing software for corporate financial reporting (Lee, 2021).

Collier and Lambert's (2018) research aims to describe a method that supports identifying, assessing, and managing project risks under high levels of uncertainty using a scenario-based method. The innovation of this work is to develop a strategy to support risk management and cost-benefit decision-making by assisting in selecting management actions to reduce the impacts of disruptive scenarios. The authors valuate also "several management actions in mitigating project disruptions, accounting for benefits and costs" (p. 593).

The study by Dwirandra and Astika (2020) entitled "Impact of Environmental Uncertainty, Trust and Information Technology on User Behavior of Accounting Information Systems" aims to determine the relationship between environmental uncertainty, trust, and information technology behaviour in accounting information systems. Data were collected using two questionnaires (information technology managers and executives). Based on the results, it was concluded that information technology management is effective on organisational performance. It has been shown that with proper information technology (IT) management, uncertainty in IT implementation will be successfully resolved, and errors will be corrected earlier, which leads to lower costs and higher quality of IT services (Dwirandra & Astika, 2020).

Yang, Fan and Zhou's (2022) research entitled "Borderless Fusion Financial Management Innovation Based on Speech Recognition Technology" reports that the current e-commerce financial management still uses the traditional accounting method, which is inefficient and cannot be integrated into new technologies. Therefore, according to the authors, this study proposes an integrated voice recognition system used for data collection and input in the workplace to improve the efficiency and performance of financial management (Yang *et al.,* 2022).

The authors Lutfi, Alkelani, Al-Khasawneh, Alshira'h, Alshirah, Almaiah, Alrawad, Alsyouf, Saad, Ibrahim (2022) wrote the article "Influence of Digital Accounting System Usage on SMEs Performance: The Moderating Effect of COVID-19" where they explain that accounting information is a fundamental basis for business decision making. The extensive use of digital technology has paved the way for the efficiency and effectiveness of accounting functions, i.e., a digital accounting system (DAS) allows the communication and processing of large amounts involved in transactions and generates the data necessary for analysis. A questionnaire survey was conducted on 183 SMEs in Jordan using the partial least squares structural equations statistical method to analyse the impact of using digital accounting on small and medium-sized enterprises (SMEs) (Lutfi *et al.,* 2022).

The relationship between business analytics and management accounting and cost performance was evaluated in Metin's (2021) study entitled "The Role of Business Analytics in Transforming Management Accounting Information into Cost Performance". The increase of internet-based applications affects cost accounting and management so business analytics can play an essential role in the effectiveness of management accounting.

According to Shi (2021), with e-commerce, there is no longer a need for face-to-face transactions between sellers and consumers. Therefore, the author's study entitled "Research on the influence of accounting computerisation and networking on e-commerce" explains that this has had repercussions on the traditional accounting sector, leading to the computerisation of accounting. However, the study concludes that computerisation improves the speed and accuracy of accounting information processing.

The study titled "New Development of Online Retail in China and the Associated (Accounting) Challenges" by Xiong, Chapple, Song, and Hui (2019) discusses and analyses the gradual development of online shopping in China, as well as the associated challenges, namely concerning accounting, such as application of accounting standards, deposit expansion, return postage insurance, and In-Store Pick-Up Service (Xiong *et al.,* 2019).

The study of Krupka, Nazarova, Pravdiuk, Myskiv, and Yevdokymova (2022), entitled "Electronic Settlements in the enterprise and their accounting and information support", aimed to analyse electronic payments, digitalisation of (non-cash) payments in international market businesses and accounting information, so that electronic transaction records automatically appear in the company's accounting system (Krupka *et al.,* 2022).

The article "Development of Electronic Commerce in Ukraine and in the world", authored by Stroiko, Burkun, and Mulenko, shows that with the growth of technology, the question of its proper use in every business entity, organisation and financial institution has arisen. The authors argue that developing information technology (IT) is the key to the sustainable financial growth of the country under study (Ukraine). With this, the creation of software for the finance and accounting of a company, namely EPR and CRM systems, facilitates human resources management, assets, and final product production (Stroiko *et al.,* 2020).

Table 5 shows the articles belonging to the accounting area.

TABLE 5: Total publications belonging to the field of accounting.

RO	AUTHOR(S)	YEAR	TITLE
1	Shang, H. J., Li, W. J., Li, G. X., Zhao, S., Li, L. & Li, Y. J.	2022	Analysis and Application of Enterprise Performance Evaluation of Cross-Border e-commerce Enterprises Based on Deep Learning Model
2	Zhou, K.	2023	Financial model construction of a cross-border e-commerce platform based on machine learning
3	Lee, C. C.	2021	Analysis on the strategy of improving management consulting business performance: Evidence on a management consulting company established by an accounting firm
4	Collier, Z. A. & Lambert, J. H.	2019	Evaluating Management Actions to Mitigate Disruptive Scenario Impacts in an e-commerce Systems Integration Project
5	Dwirandra, A. A. N. B. & Astika, I. B. P.	2020	Impact of Environmental Uncertainty, Trust and Information Technology on User Behaviour of Accounting Information Systems
6	Yang, L., Fan, Z. H. & Zhou, J.	2022	Borderless Fusion Financial Management Innovation Based on Speech Recognition Technology
7	Lutfi, A., Alkelani, S. N., Al-Khasawneh, M. A., Alshira'h, A. F., Alshirah, M. H., Almaiah, M. A., Alrawad, M., Alsyouf, A., Saad, M. & Ibrahim, N.	2022	Influence of Digital Accounting System Usage on SMEs Performance: The Moderating Effect of COVID-19
8	Metin, U.	2021	The Role of Business Analytics in Transforming Management Accounting Information into Cost Performance
9	Shi, W. Q.	2021	Research on the influence of accounting computerisation and networking on e-commerce
10	Xiong, F., Chapple L., Song, X. Y. & Hui, K. N.	2019	New Development of Online Retail in China and the Associated (Accounting) Challenges
11	Krupka, Y., Nazarova, I., Pravdiuk, N., Myskiv, L. & Yevdokymova, N.	2022	Electronic settlements in the enterprise and their accounting and information support
12	Stroiko, T., Burkun, V. & Mulenko, A.	2020	Development of electronic commerce in Ukraine and in the world

LEGEND: RO-Ranking Order.

SOURCE: Developed by the author.

5. CONCLUSIONS

In this study, a bibliometric analysis of articles specifically focused on e-commerce (related to accounting and accounting areas) published from 2000 to 2023 in journals indexed in the WoS database was conducted, assessing the impact of authors, journals, countries/regions, organisations, and topics, as well as their temporal evolution, to systematise existing research. Eighty-nine articles were analysed, most published between 2019 and 2023, with 2022 being the most evident and notable year in the number of articles published. Thus, the analysis shows that relatively few studies published in the last two decades focused on the importance of accounting and e-commerce. Until 2015, only an average of one article per year was published. However, on the other hand, we observe a positive trend in the growth of scientific production on the subject.

We also found that the journals that have published the most articles on this topic are "Sustainability", "Mobile Information Systems", and "Electronics", followed by "Journal of Theoretical and Applied Electronic Commerce Research", IEEE Access, and Baltic Journal of Economic Studies. Although many authors have shown interest in the importance of e-commerce, they have yet to be particularly productive, as less than 20 per cent of them have produced more than one article. Bocean C. G., Ingaldi M. and Varzaru A. A. are the authors with the most publications on the subject. Similarly, China is the country that stands out in this research topic, as well as the organisation Częstochowa University of Technology (Poland) and University Craiova (Romania)

It was found that, in a total of 89 articles, the most used keywords were "E-commerce", "Management", "E-business", "Digital Economy", "Logistics", "Business Model", "Online", and "Sustainability".

The most cited article was written by Zhu, K & Kraemer, K. L., titled "Post-adoption variations in usage and value of e-business by organisations: Cross-country evidence from the retail industry". It was published by Information Systems Research in 2005. This journal also has the highest number of citations. In this work, the authors analyse whether the economic environments impact e-business usage and value. "Information & Management", University of California Irvine and USA are the journal, organisation, and region most cited, respectively.

Regarding the Structural Knowledge groups, the work "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error" by Claes Fornell and David F. Larcker (1981) was the most cited and has the greatest total link strength, which indicates that there are studies related to statistical techniques of data analysis (Structural Equation Modelling) and correlation research, such as the multiple linear regression and logistic regression methods. Most studies are qualitative in approach, using content analysis and literature review. Interviews, surveys, and case studies are used to a lesser extent. Most empirical studies analyse e-commerce companies compared to traditional commerce companies. From a theoretical point of view, studies on e-commerce have been based on various theories commonly used in research on digitalisation, stakeholders, online trust, quality, e-commerce logistics (distribution network) and sustainable management.

Many studies have aimed to compare e-commerce with the traditional business model by identifying the differences. In this sense, e-commerce financing, logistics management, performance evaluation, type of technology used, and consumer behaviours have been analysed.

In this study, we found that the publications in the research area cited essential works, such as those by Fornell and Larcker, DeLone and McLean, and Venkatesh and Davis. These works are related to statistical data analysis techniques and use contingency theory as a theoretical framework and critical literature reviews to evaluate the processes within companies (managerial behaviour and organisation and market performance).

In conclusion, in the last four years, scholars have increased interest in studying the importance of e-commerce as a specific research topic. The interest in the topic can be explained by the strategic role of a company in becoming

innovative and more efficient and, on the other hand, by the pandemic experienced worldwide for three years that made companies must adjust their business model.

This study contributes to the e-commerce literature by carrying out a systematisation of existing research on the effect of e-commerce on firms' management control, assessing the characteristics (i.e., year of publication, authors, country of origin, journals, etc.) and impact of published articles, identifying the topics that have taken the most research attention and critically analysing the research that has been carried out on the topic.

Thus, this article aims to contribute to the scientific community, companies, and their most diverse professionals with an active role within or outside the research topic. Hence, conducting future research on other aspects of e-commerce and environmental sustainability is pertinent.

The results of this study are limited to articles published in journals indexed in the WoS database, which does not allow generalising the results since a specific database obtained the sample. This study focuses on the bibliometric analysis of the literature and not on the content analysis of the publications. The search trends were conducted manually.

However, using bibliometrics techniques proved adequate for identifying the essential characteristics of scientific production in e-commerce. The study can be adopted as a support tool for future researchers who show interest in the topic and intend to research it since it provides leading publications, prominent journals, authors, and organisations.

At the level of future lines of research, we identified the following research trends: (1) the impact of e-commerce on the environment (e.g. sustainable management); (2) the evaluation of the variables of the internet purchasing process (e-shop, communication and delivery); (3) consumer behaviour (trust in e-commerce); and (4) the factors contributing to the efficiency/quality of companies adopting the e-commerce business model (innovation, performance evaluation and reorganisation of activities).

In this study, we reinforce the importance of adopting e-commerce, with technological and digital evolution, for the survival and growth of public and private organisations and, consequently, for developing countries.

Our analyses only included the WoS database as a source of data collection. Other databases, such as Google Scholar and Scopus, should also be considered to analyse research on employee-related disclosure. To overcome this limitation, future studies could broaden the sample of research articles by selecting more databases to develop comparative studies based on different databases. Future research could also conduct a qualitative analysis to deepen the knowledge about this research area.

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DIGITAL NOMADS — THE CASE OF THE AUTONOMOUS REGION OF MADEIRA

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ABSTRACT

In 2021, the pioneering project "Digital Nomads Madeira Islands" (DNMI) started in the Autonomous Region of Madeira (ARM). Specific objectives were defined to systematize the evolution of digital nomads (DN) from 2020 to 2022 and summarize their sociodemographic characteristics and trends. Through a questionnaire, this quantitative and descriptive study aims to understand the reality of DN in the ARM. The sample consists of 14,960 DN registered within the scope of DNMI project by Startup Madeira, who responded to the questionnaire between November 2020 and December 2022. It was observed that the project attracted DN from all around the world, surpassing 135 countries. The most significant profession represented was "Software and Applications Developers and Analysts." The year 2021 had the highest number of registrations of DN, possibly due to the novelty of Digital Nomads Village project and coinciding with the COVID-19 pandemic period. This study provides a significant contribution on multiple levels.

KEYWORDS: Autonomous Region of Madeira; Digital Nomads; Digital Nomads Madeira Islands; Digital Nomads Village; Startup Madeira.

1. INTRODUCTION

Technology and the digital work environment have been reshaping societies' daily lives. Technological terminals are more advanced, shared workspaces (e.g., coworking) have been created, and state-of-the-art wireless internet, among other examples, has enabled an expansion of possibilities in the national and international job market. Simultaneously, as Drucker (2019) asserted, we live in an era of the knowledge worker, where intellectual work is not defined by quantity but by results. The evolution of knowledge has empowered workers, freeing them from the need to be tied to a physical workplace, and organizations are aware that many of their employees can perform their duties from anywhere.

In the 20th century, Makimoto and Manners (1997) anticipated the emergence of digital nomads and stated that they live outside the classical boundaries of organizations. The same authors consider digital nomads to be independent individuals with a lifestyle characterized by a symbiosis between work and leisure. Life is simplified through the intensive use of portable technologies, freeing people to travel while remaining connected to their work (Mourato et al., 2023). Thus, a new category of professionals has emerged who perform their work remotely from anywhere in the world, relying on digital technologies (Correia et al., 2022).

In the existing literature, various studies on the topic of digital nomads can be found from different perspectives, ranging from the advantages of remote work to employability (Chevtaeva & Denizci-Guillet, 2021), social responsibility (Mourato et al., 2023), co-living and well-being (von Zumbusch & Lalicic, 2020), personality (Castro &

Gosling, 2022), hospitality (Sousa & Joukes, 2022), and tourism (Angiello, 2022). It's worth noting that the latter emphasizes Venice and the Autonomous Region of Madeira (ARM), followed by other authors and studies that place Madeira at the center of case studies in the field (e.g., Almeida and Belezas, 2022; Angiello, 2022; Moreira et al., 2022; Mourato, 2022; Vieira, 2022).

In practice, it all began as an initiative of the Regional Government of Madeira, through Startup Madeira (Startup Madeira, 2023), aiming to capitalize on the conditions that the ARM offers in terms of outdoor activities, culture, and climate, establishing a new project called "Digital Nomads Madeira Islands."

After approximately three years, due to the success of the initiative and the interest it has sparked within the scientific community, this study aims to characterize the profile of digital nomads in Madeira, seeking to address the following questions:

- What has been the evolution of digital nomads in the Autonomous Region of Madeira over the past triennium?
- What is the sociodemographic profile of the Digital Nomad of the ARM?

The general objective of this study is to understand the reality of digital nomads in the ARM, including their sociodemographic characterization and temporal evolution. Following that, specific objectives have been defined to systematize the evolution of digital nomads from 2020 to 2022, summarize their sociodemographic characteristics, and identify trends.

Whereas the Digital Nomads Village initiative was a pioneer in Portugal and Europe, this research constitutes a substantial contribution across various fronts. It holds considerable value in shaping directives and tactics, not solely for the Digital Nomads Madeira Islands and Digital Nomads Village initiatives, but also for the tourism industry, striving toward sustainability and advancement. It acts as an important step for subsequent investigations and the cultivation of a more profound comprehension of digital nomads opting for Madeira.

In accordance with the purpose of this research, the article begins with an initial section that provides a literature review, allowing for a contextualization of the topic. The following section explains the method employed, followed by the presentation and discussion of the results. In the final section, the primary conclusions arising from this research effort are laid out.

2. LITERATURE REVIEW

2.1. DIGITAL NOMADS

The interest in investigating the phenomenon of Digital Nomads has grown, in tandem with the global movement of significant changes in work practices, lifestyle, and the quest for a balance between leisure, personal life, and work independence (Almeida et al., 2021). It's worth noting that the term "Digital Nomad" was first popularized in 1997 by Makimoto and Manners (1997), who characterized the general traits of this professional profile.

According to Chevtaeva and Denizci-Guillet (2021), the term digital nomad is often confused with remote worker, and the authors have identified several definitions of digital nomads (Table I). Despite the differences, common elements emerge in all definitions, including work in a digital environment, independence, mobility, and leisure.

TABLE I: Definitions of Digital Nomads.

DEFINITIONS OF DIGITAL NOMADS:
"Young professionals who exclusively work in an online environment while adopting a lifestyle often reliant on travel and independent of location, where the boundaries between work, leisure, and travel seem indistinct" (Reichenberger, 2017).
"They are redefining professional life by seeking jobs that enable global travel, flexibility in working hours, and a departure from the traditional office environment" (Richter & Richter, 2020).
"Individuals who, leveraging portable computing technologies and widespread internet access, can work remotely from any location and use this freedom to explore the world" (Mancinelli, 2020).
"Independent digital workers with extreme forms of spatial mobility and non-existent organizational affiliations" (Nash et al., 2021).

SOURCE: (Chevtaeva & Denizci-Guillet, 2021).

Nevertheless, amidst the various emerging research, it's important to distinguish digital nomads from, for example, freelancers, business travelers, backpackers, or even other global nomads. Chevtaeva and Denizci-Guillet (2021) summarized that digital nomads, unlike backpackers, place a significant focus on work during their travels. They choose their trips based on leisure interests and exhibit greater mobility, which sets them apart from business travelers or even freelancers. As for backpackers, they prioritize freedom and leisure over work.

According to the literature, it's possible to establish a sociodemographic profile of a typical digital nomad: they are mostly from the Western world, young professionals/millennials, unmarried, self-employed with a moderate income, and engage in activities related to fields such as digital marketing, web design, software engineering, computer programming, and video language tutoring. They seek warm and low-cost living destinations. The average duration of their travels is around three months (Chevtaeva & Denizci-Guillet, 2021; Moreira et al., 2022; Reichenberger, 2017; von Zumbusch & Lalicic, 2020).

2.2. THE AUTONOMOUS REGION OF MADEIRA AND THE NEW TOURIST PROFILE

Portugal is in the south-western tip of the Iberian Peninsula, and it includes two outermost regions: the Autonomous Region of Azores and the Autonomous Region of Madeira (ARA and ARM, respectively). The ARM is one of Portugal's two Outermost Regions (OR) and is the closest to the capital, Lisbon (1000 km). The ARM consists of the islands of Madeira, Porto Santo, Desertas, and Selvagens (Ministério dos Negócios Estrangeiros, 2023). It has a population of approximately 250,000 inhabitants, with the highest population density in the region found in Funchal (1,388 inhabitants/km^2) (Instituto Nacional de Estatística, 2023). Its economy is strongly characterized by "regional endogenous resources (natural, built, knowledge, and initiative), mainly: Tourism/Leisure, Heritage and Culture, Marine Resources and Technologies (Blue Economy), Agri-Food (agricultural production and agro-transformation), Energy and Sustainable Mobility, and Urban Rehabilitation" (Decreto Legislativo Regional n.° 17/2020/M). Currently, the ARM's strategic growth model is primarily supported by tourism.

According to the 2030 Economic and Social Development Plan of the ARM, the regional strategy focuses on several thematic areas, including Agri-Food, Tourism, Sea (Marine-Maritime), Circular Economy, Bio-Sustainability, Health and Well-Being, and Digitalization. Regarding tourism, the indicators show favorable trends for the ARM in terms of volume effects, occupancy indicators, and gains in economic and financial performance. However, this document also highlights the negative impact felt due to the emergence of the COVID-19 pandemic (Decreto Legislativo Regional n.° 17/2020/M). The current reality indeed shows a reversal of trends (post-COVID-19) and a noticeable recovery in key indicators. For example, comparing February 2023 with February 2019 (pre-pandemic), tourist accommodation activity has seen a growth of 34.2% in overnight stays. Additionally, the RevPAR (revenue per

available room) reached approximately 56.42 euros, compared to 36.14 euros in February 2019. In February 2023, approximately 85.6% of establishments reported guest activity (Direção Regional de Estatísticas da Madeira, 2023).

It's worth noting that the new generations (e.g., Generation Z) represent market opportunities in the tourism sector. Generation Z is characterized by not making a clear distinction between online and offline, as their physical and digital lives have always coexisted. As the first generation of digital natives, when it comes to travel, they are concerned about the price of travel and accommodation. However, they value socialization, seek experiences that represent local culture, and prioritize the authenticity of traveler reviews with real travel experiences and opinions over travel experts when considering their travel destination (Marques, 2022; Pereira, 2022). They look for sustainable and environmentally responsible lodging options (Mourato, 2022; Pereira, 2022). In summary, they are more inclined to travel individually and prefer temporary accommodation over acquiring a permanent residence.

The recent tourist profile emerges in parallel with the advent of new modes of work, innovative information and communication technologies, and differentiated work organization and execution (Castro & Gosling, 2022). These technologies have enabled workers to enjoy their tourist destinations while simultaneously increasing their productivity and work efficiency (Correia et al., 2022). At the same time, a new type of tourism is emerging, namely the tourism of microentrepreneurs, which, although still little studied, is becoming more visible and influential, mainly/mainly due to information technologies (Morais, 2021; Ratten, 2020). In this assumption, smart tourism becomes important, which consists of the use of information and communication technologies to facilitate and enrich tourism products/services and experiences, create sustainable economic, social, and environmental benefits for all and promote the competitiveness of the destination (Garanti, 2023).

2.3. ABOUT THE DIGITAL NOMADS MADEIRA ISLAND INITIATIVE

The recent pandemic context, caused by COVID-19, has precipitated several changes in the workplace. We observe the so-called "digital Darwinism" (Veríssimo, 2021) and modern realities emerge (e.g., hybrid work (Alves, 2021; Lopes, 2021), fewer working hours and/or work flexibility (Silva, 2021), or even telecommuting (Lei n.º 83/2021). This situation has accelerated the spread of digital nomads and, in parallel, new programs have emerged to attract and assist them, such as the Digital Nomads Madeira Islands. This project was launched in November 2020, promoted by the Regional Secretariat for the Economy of Madeira, Startup Madeira, Gonçalo Hall, with partners including the digital nomad community, local businesses, and the John dos Passos Cultural Center, NOS Madeira, international platforms, as well as communities that work directly and indirectly with this niche market. The concept was tested from February 1 to June 30, 2021. This period allowed the organization and the private partners to understand the needs of digital nomads, adapting products and services to those needs, and later presenting Ponta do Sol as a Digital Nomad Village. The project is planned to be maintained until 2024. Following that, other locations were included in the project, such as Machico (Remote East Coasters), Funchal (Madeira Friends International Community Association), Jardim do Mar (Nomadico), Santa Cruz (HomeOffice), and Porto Santo. The concept of Digital Nomads Village was pioneering and unique in Europe, garnering mentions in the press and academic research, e.g., (J. Almeida & Belezas, 2022; Angiello, 2022; Moreira et al., 2022; Mourato, 2022; Vieira, 2022). The Digital Nomads Madeira Islands and Digital Nomads Village concepts aim to provide information about accommodation, coworking spaces, and access to local community managers for digital nomads. The Regional Government of Madeira has been making efforts to invest more resources in the project, including workspace facilities, and suitable internet infrastructure (Angiello, 2022). In the last three months of 2022, the ARM saw an average of 2,500 digital nomads per month (Nomad List, 2023).

Recently, the Portuguese government aimed to streamline and update the process for granting temporary stay or residence visas to workers who wish to work remotely in Portugal for an employer located outside Portuguese territory. Among the various objectives, it allows the visa holder to reside in Portugal and work remotely, whether as

an individual or as a company with a domicile or headquarters outside the national territory (Lei n.º 18/2022). These are some of the variables contributing to the potential for exponential growth in the Digital Nomads Madeira Islands and Digital Nomads Village projects.

2.4. THE BUSINESS SECTOR AT THE ARM — THE CONTRIBUTION OF TOURISM

An enterprise means any entity that carries out an economic activity, regardless of its legal status (Decreto-Lei n.º 135-B/2017). Because the economic activity is determinant and not its legal form, self-employed persons, family businesses, partnerships, and associations or other entities carrying out economic activities on a regular basis may be regarded as undertakings (European Commission, 2015).

At regional level, in terms of size, regional enterprises belong almost exclusively (99.92%) to the Small and Medium-sized Enterprises (SMEs) group. Among these, most are micro-enterprises (95.93% of SMEs). The number of medium-sized non-financial companies stood at 171 (+12.5%) in 2021 compared to 2020, while large companies did not exceed 24 (+14.3% compared to 2020) (Direção Região de Estatística da Madeira, 2023a). In 2021, 4,427 (+25.8% compared to 2020) companies based in the Autonomous Region of Madeira were born. In 2021, there were 4,367 non-financial companies in the Autonomous Region of Madeira, translating into 866 more (+24.7%) than in the previous year and 156 (+3.7%) more compared to 2019. “Other services,” “Accommodation and Catering,” “Commerce” and “Construction and Real Estate Activities” were the sectors of activity where the most companies were founded (+2 594, +413, +366 and +363, respectively). In terms of turnover, the new companies in “Other Services,” “Commerce,” and “Accommodation and Restaurants” contributed 35.8, 12.9 and 10.7 million euros, respectively. “Information and Communication” activities, “Other Services” and “Transport and Storage” recorded the highest birth rates: 25.1%, 20.4% and 15.2%, respectively (Direção Região de Estatística da Madeira, 2023b).

It is well known that the Tourism sector at the ARM is a driver of its economy. Within tourism, we have a panoply of businesses, among which: travel agencies and tour operators, hotels, restaurants, shops, airports, transportation, among others (Associação Comercial e Industrial do Funchal & KPMG, 2014).

According to data from the Direção Regional da Estatística da Madeira (2022), the Gross Value Added generated by Tourism (VABGT) reached, in 2019, 16.2% of the GVA of the regional economy, amounting to a total of 732.1 million euros. The Consumption of Tourism in the Economic Territory (CTTE), which summarizes the tourist demand, was around 1,477.4 million euros, representing 28.8% of Gross Domestic Product (GDP). In 2020 the GDP of the Autonomous Region of Madeira reached 4,449.6 million euros. Thus, tourism is an indispensable source of revenue, so Madeira’s regional strategic orientation has a focus on innovation and internationalization. The rejuvenation of the business fabric can contribute to this goal (Instituto de Desenvolvimento Regional, 2019).

According to Nomad List (2023), in Madeira a digital nomad has 2,090 euros of expenses per month on average, an expat of about 1,570 euros. The same source states that in 2021 about 1,700 digital nomads passed through the ARM on average per month and in 2022 about 2,300 digital nomads.

3. METHOD

The present study is quantitative and descriptive, employing a questionnaire for data collection, which was analyzed using IBM SPSS Statistics and Microsoft Excel software. The questionnaire was distributed between November 2020 (following the launch of the Digital Nomads Madeira Islands website) and December 2022. The information collected during the COVID-19 pandemic was gathered through a form specifically targeted at digital nomads interested in relocating to Madeira to work remotely, benefiting from the information and project details of the Digital Nomads Village in Ponta do Sol. The literature review provided the theoretical foundation, and according to Gil (2017), one of the characteristics of quantitative and descriptive studies is the use of standardized techniques, such as questionnaires and systematic observation.

The data was collected via an online questionnaire using Google Forms. The sample consists of 14,960 digital nomads registered within the scope of the Digital Nomads Madeira Islands project by Startup Madeira, who responded to the questionnaire between November 2020 (project inception) and December 2022. The questionnaire was constructed to provide information that could identify the profile of the digital nomad that was willing to stay in Madeira Island, such as main contacts, so personalized information could be sent (e.g., job title, age, and estimated date of arrival and departure). All those who have completed their registration on the Digital Nomads Madeira Islands website have been included in this database, with the database having limited access to the program's organizers. Access to the answers was shared with the authors, respecting the personal details (e.g., name and contacts), which were omitted before the analysis.

It's noteworthy that the use questionnaire includes variables such as "Year," "Home Country," "Age Group," "Planned Duration of Stay," "Planned Accommodation Location(s)," and "Main Activity(ies)," which are crucial for addressing the research questions previously outlined.

After the completion and submission of the questionnaire, the responses were automatically recorded in the database. The generated data were later transferred to the IBM SPSS Statistics software for statistical analysis.

The data treatment and analysis were conducted using statistical methods, including summary measures within the scope of Descriptive Statistics. Beforehand, the country of origin was recoded into 10 sociocultural regions according to the subdivision presented in (Ferreira, 2019), and the professional activities were recoded into 14 categories based on the International Standard Classification of Occupations (International Labour Office, 2012).

4. RESULTS/DISCUSSIONS

A total of 14,960 digital nomads participated in this study. In terms of evolution over the analyzed period, addressing the initial question, it was found that 2021 had the highest number of digital nomads (68%), decreasing to 4,631 (31%) in the following year (Table II).

TABLE II: Number and Percentage of Digital Nomads by Year and Sociocultural Region.

YEAR	2020		2021		2022		TOTAL	
	N	%	N	%	N	%	N	%
North America	28	1.14%	1,831	74.3%	605	24.6	2,464	16.5%
Latin America	8	0.46%	1,350	78.2%	369	21.4	1,727	11.5%
Europe	152	1.73%	5,770	65.7%	2,858	32.6	8,780	58.7%
Islamic World	3	0.82%	221	60.5%	141	38.6	365	2.4%
African World	4	1.52%	167	63.5%	92	35.0	263	1.8%
Indian World	1	0.39%	195	76.2%	60	23.4	256	1.7%
Russian Orthodox	5	0.57%	450	51.1%	425	48.3%	880	5.9%
Extreme Orient	3	6.00%	24	48.0%	23	46.0%	50	0.3%
Southeast Asia	1	1.30%	52	67.5%	24	31.2%	77	0.5%
Australia and Oceania	1	1.19%	50	59.5%	33	39.3%	84	0.6%
No Information	2	14.29%	11	78.6%	1	7.1%	14	0.1%
Total	208	1.39%	10,121	68%	4,631	31%	14,960	100%

SOURCE: Own elaboration.

Regarding the age group from a global perspective, it can be noted that the most common age group is "between 31 and 40 years old" (39.69%). Considering the regions with the highest number of inscriptions of digital nomads, in

Europe, the most frequent age group is “between 21 and 30 years old” (42.72%), and in North America, it is “between 31 and 40 years old” (34.5%) (Table III).

TABLE III: Number and Percentage of Digital Nomads by Age Group and Sociocultural Region (2020–2022).

AGE (YEARS)	LESS THAN 20		BETWEEN 21 AND 30		BETWEEN 31 AND 40		BETWEEN 41 AND 50		BUT FROM 50		ABSENT		TOTAL
	N	%	N	%	N	%	N	%	N	%	N	%	N
North America	4	0.16	660	26.79	850	34.50	465	18.87	480	19.48	5	0.20	2,464
Latin America	6	0.35	553	32.02	746	43.20	291	16.85	114	6.60	17	0.98	1,727
Europe	40	0.46	3,751	42.72	3,493	39.78	994	11.32	498	5.67	4	0.05	8,780
Islamic world	3	0.82	146	40.00	163	44.66	40	10.96	13	3.56	0	0.00	365
African World	2	0.76	95	36.12	95	36.12	44	16.73	27	10.27	0	0.00	263
Indian world	0	0.00	101	39.45	105	41.02	40	15.63	10	3.91	0	0.00	256
Russian Orthodox	5	0.57	390	44.32	391	44.43	74	8.41	20	2.27	0	0.00	880
Extreme Orient	0	0.00	20	40.00	20	40.00	4	8.00	6	12.00	0	0.00	50
Southeast Asia	0	0.00	23	29.87	31	40.26	17	22.08	4	5.19	2	2.60	77
Australia and Oceania	0	0.00	21	25.00	41	48.81	14	16.67	8	9.52	0	0.00	84
No Information	0	0.00	6	42.86	3	21.43	2	14.29	1	7.14	2	14.29	14
Total	60	0,4	5,766	38.54	5,938	39.69	1,985	13.27	1,181	7.89	30	0.20	14,960

SOURCE: Own elaboration.

Regarding the number of planned accommodation locations, more than 90% planned to stay in a single location. From a global perspective, the municipality that hosted the largest number of digital nomads was the municipality of Ponta do Sol (76.24%), followed by the municipality of Funchal (15.69%). Analyzing from an annual perspective, the same trend was observed.

Regarding the length of stay, the most frequent estimate (mode) was between 1 to 2 months (approximately 36.5%), followed by the response “3 to 4 months” (12.8%) and less than 1 month (12.4%). Only 2.4% considered staying for more than 5 months and less than 11 months. From a perspective of long-term accommodation, i.e., exceeding 11 months, 461 respondents (3.1%) considered this possibility. It’s worth noting that 33% of respondents did not have an estimate regarding the duration of their stay (Table IV).

TABLE IV: Number and Percentage of Digital Nomads by Planned Duration of Stay (in Number of Months) and Sociocultural Region (2020–2022).

ESTIMATED LENGTH OF STAY (MONTHS)	LESS THAN 1		BETWEEN 1 AND 2		BETWEEN 3 AND 4		BETWEEN 5 AND 6		BETWEEN 7 AND 8		BETWEEN 9 AND 10		MORE THAN 11		ABSENT		TOTAL
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N
North America	214	8.69	863	35.02	421	17.09	40	1.62	11,00	0.45	1	0.04	83	3.37	831	33.73	2,464
Latin America	86	4.98	388	22.47	369	21.37	65	3.76	9,00	0.52	3	0.17	92	5.33	715	41.40	1,727
Europe	1,408	16.04	3,684	41.96	768	8.75	132	1.50	14,00	0.16	4	0.05	145	1.65	2,625	29.90	8,780
Islamic world	44	12.05	99	27.12	53	14.52	6	1.64	0,00	0.00	0	0.00	20	5.48	143	39.18	365
African World	10	3.80	50	19.01	53	20.15	14	5.32	3,00	1.14	0	0.00	32	12.17	101	38.40	263
Indian world	15	5.86	68	26.56	55	21.48	8	3.13	2,00	0.78	0	0.00	24	9.38	84	32.81	256
Russian Orthodox	58	6.59	231	26.25	168	19.09	19	2.16	4,00	0.45	1	0.11	55	6.25	344	39.09	880
Extreme Orient	2	4.00	21	42.00	5	10.00	1	2.00	0,00	0.00	0	0.00	2	4.00	19	38.00	50
Southeast Asia	5	6.49	15	19.48	11	14.29	3	3.90	1,00	1.30	0	0.00	6	7.79	36	46.75	77
Australia and Oceania	7	8.33	29	34.52	12	14.29	5	5.95	1,00	1.19	0	0.00	2	2.38	28	33.33	84
No Information	1	7.14	8	57.14	1	7.14	0	0.00	0,00	0.00	0	0.00	0	0.00	4	28.57	14
Total	1,850	12,37	5,456	36,47	1,916	12.81	293	1.96	45,00	0.30	9	0.06	461	3,08	4,930	32,95	14,960

SOURCE: Own elaboration.

Regarding the professional activities carried out, on a global scale and throughout the data collection period, the vast majority exclusively engage in a single professional activity (93.03%). Approximately 655 respondents engage in two or more activities (4.38%), as shown in Table V. The main identified professional activity throughout the period was “Software and applications developers and analysts” (reported by 24.06% of respondents who answered this question), followed by “Business services and administration managers” (15.66%) (Table VI).

TABLE V: Number and Percentage of Digital Nomads by Number of Professional Activities per Sociocultural Region (2020–2022).

PROFESSIONAL ACTIVITY NO.	ONE ACTIVITY		TWO ACTIVITIES		THREE ACTIVITIES		ABSENT		TOTAL
	N	%	N	%	N	%	N	%	N
North America	2,296	93.18%	96	3.90%	19	0.77%	53	2.15%	2,464
Latin America	1,583	91.66%	51	2.07%	4	0.16%	89	3.61%	1,727
Europe	8,168	93.03%	384	15.58%	28	1.14%	200	8.12%	8,780
Islamic world	339	92.88%	19	0.77%	1	0.04%	6	0.24%	365
African World	241	91.63%	13	0.53%	3	0.12%	6	0.24%	263
Indian world	241	94.14%	10	0.41%	1	0.04%	4	0.16%	256
Russian Orthodox	840	95.45%	18	0.73%	0	0.00%	22	0.89%	880
Extreme Orient	44	88.00%	4	0.16%	0	0.00%	2	0.08%	50
Southeast Asia	72	93.51%	2	0.08%	0	0.00%	3	0.12%	77
Australia and Oceania	81	96.43%	2	0.08%	0	0.00%	1	0.04%	84
No Information	12	85.71%	0	0.00%	0	0.00%	2	0.08%	14
Total	13,917	93%	599	4%	56	0,37%	388	2.59%	14,960

SOURCE: Own elaboration.

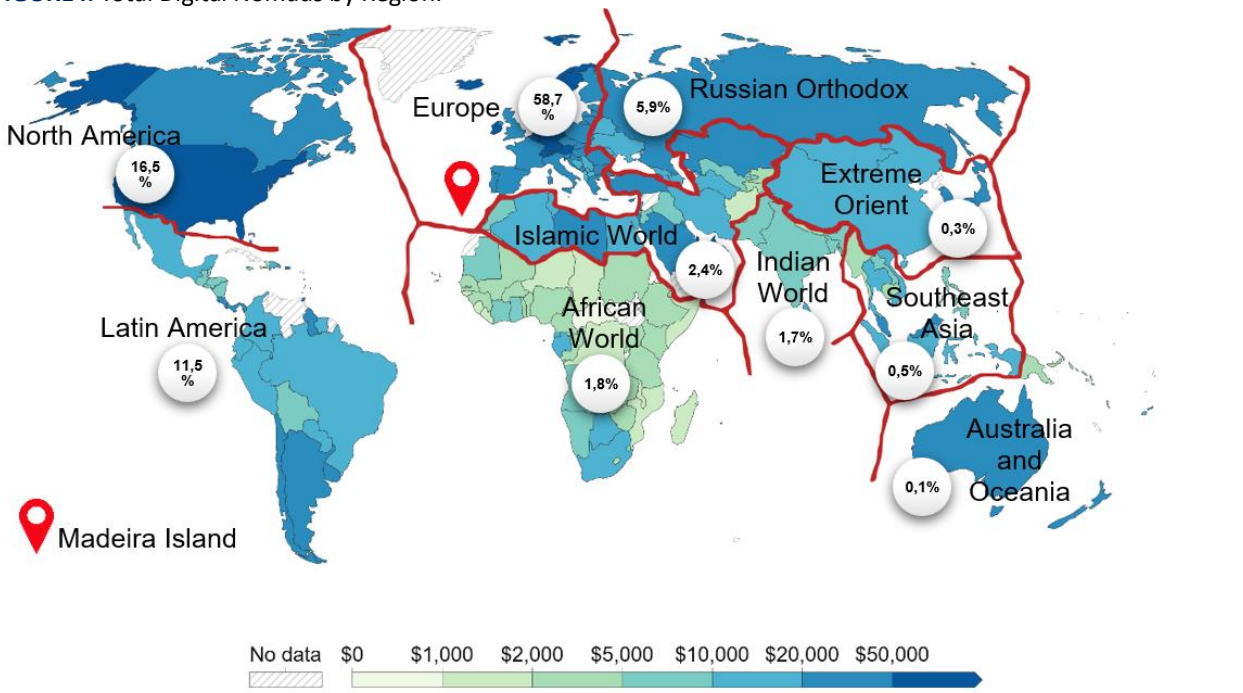
TABLE VI: Number and Percentage (Valid) of Digital Nomads by Professional Activity, by Year and Sociocultural Region (2020–2022).

PROFESSIONAL ACTIVITIES	2020		2021		2022		TOTAL	
	N	%	N	%	N	%	N	%
Managing Directors and Chief Executives	33	15.42%	809	7.83%	375	7.91%	1,217	7.96%
Business Services and Administration Managers	30	14.02%	1,645	15.92%	719	15.18%	2,394	15.66%
Sales, Marketing and Development Managers	18	8.41%	630	6.10%	295	6.23%	943	6.17%
Other Professions	23	10.75%	1,147	11.10%	466	9.84%	1,636	10.70%
Architects, Planners, Surveyors and Designers	4	1.87%	336	3.25%	147	3.10%	487	3.19%
Other Teaching Professionals	10	4.67%	479	4.64%	159	3.36%	648	4.24%
Finance Professionals	8	3.74%	357	3.46%	168	3.55%	533	3.49%
Administration Professionals	10	4.67%	537	5.20%	282	5.95%	829	5.42%
Sales, Marketing and Public Relations Professionals	17	7.94%	857	8.30%	428	9.03%	1,302	8.52%
Software And Applications Developers and Analysts	45	21.03%	2,387	23.11%	1,245	26.28%	3,677	24.06%
Social And Religious Professionals	4	1.87%	223	2.16%	94	1.98%	321	2.10%
Authors, Journalists and Linguists	5	2.34%	415	4.02%	156	3.29%	576	3.77%
Creative And Performing Artist	5	2.34%	291	2.82%	140	2.95%	436	2.85%
Student, retired, gap year and unemployed	2	0.93%	218	2.11%	64	1.35%	284	1.86%
Total	214	1,40%	10,331	67,60%	4,738	31.00%	15,283	100.00%

Source: Own elaboration.

Regarding the sociocultural distribution, it is worth noting that most registrations (58.7%) are from Europe, and approximately 16.5% of respondents are from North America, which together accounts for over 75% of the total respondents. It was observed that these two regions have higher GDP values. In contrast, the Far East and Southeast Asian regions have lower GDP values (Figure I).

FIGURE I: Total Digital Nomads by Region.



Source: Data compiled from multiple sources by World Bank
Note: This data is expressed in international-$[1] at 2017 prices.

OurWorldInData.org/economic-growth • CC BY

1. **International dollars**: International dollars are a hypothetical currency that is used to make meaningful comparisons of monetary indicators of living standards. Figures expressed in international dollars are adjusted for inflation within countries over time, and for differences in the cost of living between countries. The goal of such adjustments is to provide a unit whose purchasing power is held fixed over time and across countries, such that one international dollar can buy the same quantity and quality of goods and services no matter where or when it is spent. Read more in our article: What are Purchasing Power Parity adjustments and why do we need them?

SOURCE: Adapted from (Our World in Data, 2023).

The socio-demographic profile of a typical digital nomad is mostly independent workers, with experience and professional activity in areas of technology, who work for other companies, or as freelancers or are entrepreneurs (Borges et al., 2022; Garcez et al., 2022). The results presented corroborate the results found in the literature.

5. FINAL CONSIDERATIONS

In the current social context, it's important to note that digital technologies and tourism are interconnected in various ways. On the one hand, they enable the provision of tourism services, sales, and increased knowledge. On the other hand, they facilitate mobility and the emergence of new professionals who can perform their activities anywhere in the world. As mentioned by Correia et al. (2022), digital nomads represent a new lifestyle in which creating and generating value is essential. In this new segment, characterized by regular travel and a search for inspiring environments and places, there are new opportunities and challenges for organizations to hire their services, the locations where they stay, and the governmental entities of the regions hosting them.

From a market opportunity perspective, it is essential to understand the profile of digital nomads and their needs to develop a strategy that provides added value and addresses those needs. As observed from the data analysis, the

characteristics of these visitors (e.g., their region of origin, length of stay, etc.), combined with the high number of digital nomads choosing the ARM as their location to work, can represent a significant source of revenue.

On the challenging side, it will be necessary to create a sustainable balance for the entire ecosystem that is directly or indirectly related to digital nomads. For example, recently, the city of Lisbon has been indicated as a location that falls short of expectations (Ribeiro, 2023). Simultaneously, there is an economic period of inflation with a noticeable loss of purchasing power and a significant increase in prices. Digital nomads represent a niche market that seeks specific services and locations with differentiated needs, therefore their contribution to the regional economy should be considered. To minimize any potential impact, it will be necessary to take a proactive approach and present well-founded strategies and solutions. However, according to the Nomad List platform, in August 2023, Madeira had a rating of 3.95/5 (Nomad List, 2023).

The year 2021 had the highest number of registrations of digital nomads, which can be justified not only by the novelty factor of the Digital Nomads Village project but also by coinciding with the period of the COVID-19 pandemic. Despite being a robust sample, it should be noted that, although the Digital Nomads Village project boosted the increase in the number of digital nomads in Madeira, our sample (as it is not probabilistic) may not be very representative of all digital nomads who choose the region to carry out their work. Therefore, it can be inferred that there are more digital nomads than those registered in the Digital Nomads Madeira Islands' project. For example, in 2022, on the Nomad List platform, the number of digital nomads in Madeira exceeded 20,000 (Nomad List, 2023). Considering an estimate of 2,000 monthly digital nomads and a monthly expense of 2,000 euros for each, according to the Nomad List (2023), it can be deduced that the DNMI had an impact of 4 million euros, mostly on local businesses, in terms of accommodation, catering, transport, leisure, among others. On the other hand, considering the current configuration of the business fabric in Portugal and particularly in the ARM, this value represents a huge and important contribution to tourism.

It was observed that a significant portion of the digital nomads were entrepreneurs, which could represent opportunities for investment in Madeira's business sector. Regarding the regions from which digital nomads originate, it was found that the project attracted digital nomads from all over the world, spanning over 135 different countries. To ensure the continuous flow of this type of tourists/workers, it is important to ensure and strengthen mobility with direct flights. It was also noted that the regions with the highest number of digital nomads are geographically closer to Madeira and have a higher GDP.

5.1. THEORETICAL AND PRACTICAL IMPLICATIONS

The conclusions of this study on the presence of digital nomads in Madeira are noteworthy and are supported by concrete research data. The main implications of this study are as follows:

- Transformation in the Digital Work Environment: Technological advancement and proliferation of digital environments have profoundly changed the nature of work. For example, the peak of digital nomads in 2021 (68%) illustrates remarkable growth, while the decrease to 31% in 2022 highlights the volatility of this phenomenon, influenced by global events.
- The Era of Knowledge Workers: The emphasis on valuing work based on results, rather than the number of hours worked, is in line with the predominance of the age group "between 31 and 40 years" (40%) among digital nomads, suggesting that this approach is particularly adopted by this demographic group.
- Digital Nomads: Most digital nomads originate from Europe and North America (over 75%), emphasizing the influence of the high GDPs of these regions, which enables people to adopt this lifestyle.
- The Case of Madeira: The success of the "Digital Nomads Madeira Islands" initiative, with its positive rating on the Nomad List platform, points to a promising model to be followed by regions interested in attracting digital nomads, demonstrating the tangible results of this strategy.

- Trends in Tourism and the Labor World: The relationship between changes in the profile of tourists and the increase in digital nomads suggests opportunities for collaboration between sectors, particularly between tourism and technology, with the aim of optimizing visitor experience.
- Growth Potential: The availability of visas for remote workers in Portugal reinforces the potential for the expansion of these initiatives, generating economic opportunities for regions that invest in digital infrastructure and accommodation. The monthly contribution of digital nomads to the ARM and, concomitantly, to tourism is significant, both in immediate net terms and in terms of indirect benefits.
- Diversity of Digital Nomad Origins: The comprehensive geographical diversity of digital nomads, coming from more than 135 countries, highlights the globalization of this phenomenon and the need to adapt attraction strategies for diverse audiences.
- Entrepreneurial Profile of Digital Nomads: The significant presence of entrepreneurs among digital nomads opens prospects for investment and collaboration in the local business scene.
- Professional Activities: The predominance of the profession "Software and Applications Developers and Analysts" among digital nomads (over 93%) underscores the importance of technology in this context.
- Opportunities and Challenges for Host Regions: The presence of digital nomads brings economic opportunities, and challenges related to balancing tourism and local well-being. Understanding the specific needs of this group is crucial to maximize their potential.

5.2. LIMITATIONS AND FUTURE SUGGESTIONS

This study provides a significant contribution on multiple levels. It is valuable for shaping guidelines and strategies, not only for the Digital Nomads Madeira Islands and Digital Nomads Village projects but also for the tourism sector, which aims for sustainability and prosperity. It serves as a starting point for further research and the development of a deeper understanding of digital nomads who choose Madeira. It is acknowledged that this topic extends beyond the scope of this current research.

It should be noted that the questionnaire may be a limitation, as this method can be subject to distortions, whether intentional or not. Therefore, in future research, it is suggested to use interviews to gather richer and more detailed information about the opinions of digital nomads.

Due to the broad participation in the project and its surpassing of expectations, there has been an increase in professionals (e.g., digital nomads, remote workers, tourists extending their stay for work — bleisure/workation, expats, pre-retirees, or even residents) engaging and interacting with the community in different ways. This reality could be a limitation, as the demographic characterization only applies to those who registered for this project and requested more information. It is suggested to administer a questionnaire that includes a broader range of digital nomads to expand knowledge about them, as well as to investigate the role of community managers in Digital Nomad Villages.

For future research, it is recommended to gain an understanding of the motives and intentions behind choosing Madeira for remote work through interviews or follow-up questionnaires. From an economic perspective, it is advisable to assess the economic impact on Madeira resulting from these tourists/workers.

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EURYTHMY OF ETHICS AND HAPPINESS IN ENTREPRENEURSHIP

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ABSTRACT

The essential objective of this article is to investigate the considerations about the concept of ethics and happiness. Ethics and Happiness are directly linked to the use of reason, insofar as happiness is the purpose of ethics." The unity of ethics and happiness is established through the concept of eurythmy. It alludes to fundamental values that do not need demonstration for a person to enjoy happiness. As happiness is the fair measure of the use of "reason and emotion," it is concluded that to achieve it ethically we must avoid fragile forms of happiness, since happiness aspires to an "intelligent heart" and not to an "intelligence without heart. The article consists of two parts; In the first, ethics and values are discussed, key elements for happiness, dialoguing with Aristotle, Daniel Serrão and Damásio, in the second, we enter into dialogue, in addition to the authors already mentioned, with Kant, about happiness and the fragile forms of happiness. It is concluded that happiness and ethics in Aristotle and Daniel Serrão converge and morality and happiness in Kant, despite being different from the first, is not necessarily contrary. Different from each other, there is a compatible eurythmy.

KEYWORDS: Ethics; Happiness; Morality; Values.

1. INTRODUCTION

Ethics and happiness are two words that harmonize well with each other. However, what do we understand by ethics, and how do we attain happiness? Ethics allows for the consideration of personal and social values in the decision-making process, and it is this consideration that aims at happiness as the most desired good for human beings. This implies that to be happy, the relationship with others is essential. Therefore, personal ethics alone is not enough; it must be based on social ethics. Happiness requires the capacity for moderation. Deliberation and prudence are necessary in the actions and deeds we undertake. Deliberation in assessing the values present in a particular situation and prudence in choosing the correct action. Happiness is the supreme good that we all seek. In Aristotle, happiness is the sweetest part of life, and to live happily is to love what one loves because one who loves knows to whom and how to give their love. There is a eurythmy between the two terms. Therefore, ethics in Aristotle and in Daniel Serrão requires that we avoid "fragile forms of happiness" to achieve the highest form of freedom. Ethics is the purpose and reason for our happiness. In a brief dialogue with Kant, we perceive a certain ambiguity that distances morality from happiness. Happiness in Kant is not an end in itself, but the author appeals to the moral duty to be worthy of happiness.

2. ETHICS AND HAPPINESS IN PERFECT EURYTHMY

Ethics and happiness are two words that articulate in perfect eurythmy[1]. The congruence between them is emphasized by Aristotle: "Ethics and happiness are directly linked to the use of reason, as happiness is the purpose of ethics." We use the term "eurythmy" to affirm that ethics and happiness together form the just proportionality

[1] From the Greek *eurythmía*, "harmonious rhythm," through the Latin *eurythmĭa-*, "harmonia." Grande Dicionário Língua Portuguesa. Porto Editor, 2004.

between the parts of a whole, housing a harmonious rhythm, akin to a grand symphony, with humanity as the conductor. Thus, the human being is the architect of ethics and happiness. As an architect, the human being, as a person, has the ability to learn and grasp the "composition of eurythmy" that connects the melody (happiness) and the score (ethics) in a perfect symbiosis. The melody is in harmony with the score, and the score is related to the intensity of the melody.

In agreement with Aristotle, we assert that ethics and happiness go hand in hand in perfect eurythmy. However, in Kant, his moral doctrine seems to have no connection with the doctrine of happiness precisely because the latter is related to experience. One can only know what the concept of happiness contains through experience[2].

Thus, for Kant, happiness cannot be the ultimate goal of the rational being, as, in his view, "it is far from being, for our reason, the perfect good. Reason does not approve of it (however much inclination may desire it)." [3] As Kant states in the Doctrine of Virtue, reinforcing his position, "what constitutes my end and, at the same time, my duty is not my happiness but maintaining the integrity of my morality." [4]

In Kant's perspective, there seems to be no annulment or rejection of happiness in his thought. It is not clear that this author denies that happiness is the end of every rational being, as Aristotle says, despite affirming, albeit ambiguously, the existence of a distinction between the principle of happiness and the principle of morality. In truth, this "distinction between happiness and morality is not opposition, as pure practical reason does not want one to renounce the claim to happiness but merely not to take it into consideration when talking about duty."[5] In other words, if we want to speak of moral action, we do not necessarily speak of happiness since "the moral law promises no happiness."[6]

The question we can pose is this: if, from Kant's perspective, moral action does not promise happiness, then how do we become happy without the performance of morally good acts? Happiness in Kant plays a different role than in other positions, among which we can highlight the eudemonistic[7]. Morality in Kant is not about how we can be happy but about becoming worthy of happiness.

If, as the author says, morality is the ethical journey through which we can become worthy of happiness, then happiness in Kant also depends on morality. Without moral acts, there is no happiness. Therefore, happiness and morality in Kant enjoy a certain eurythmy, as to be worthy of happiness, we have the moral duty to be morally good.

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[2] See: Silva, C. (2012). O conceito de felicidade na filosofia moral kantiana. Principais considerações. *Revista da Faculdade de Letras — Série de Filosofia, 29*(20), 119–131.

[3] Kant, E. (2001). *Crítica da razão pura* (M. P. dos Santos & A. F. Morujão). Fundação Calouste Gulbenkian, p. 644.

[4] Kant, E. (2004). *Metafísica dos costumes — Parte II — Princípios da doutrina da virtude* (A. Morão, Trans). Edições 70, p. 23.

[5] Kant, E. (2001). *Crítica da razão prática*, *op. cit*., p. 108. See: Silva, C. (2012). O conceito de felicidade na filosofia moral kantiana. Principais considerações. *Revista da Faculdade de Letras — Série de Filosofia, 29*(20), 119–131. It is worth noting that it is precisely through this passage that John Silber criticizes Hegel's position on Kant. According to Silber, Kant does not see an inevitable conflict between form and content in ethics. "If interpreted as a critic of Kant, Hegel is fundamentally wrong in insisting on the separation and radical opposition of sensibility and reason in the moral situation," SILBER, John, "Procedural Formalism in Kant's Ethics," John, "Procedural Formalism in Kant's Ethics," Review of Metaphysics, vol. XXVIII, No. 2, 1974, p. 230. According to Silber, Hegel's major mistake lies in the confusion between Kantian formalism and logical formalism. "The reason that is the test of the law is not logical reason but practical reason," SILBER, «Procedural Formalism…," art. cit., p. 232.

[6] Kant, E. (2001). *Crítica da razão prática*, *op. cit*., p. 147.

[7] See: Silva, C. (2012). O conceito de felicidade na filosofia moral kantiana. Principais considerações. *Revista da Faculdade de Letras — Série de Filosofia, 29*(20), 119–131.

3. WHAT IS ETHICS?

According to Aristotle, in a simple definition, ethics seeks the realization of the good and the act as such. The person, endowed with reason, has the capacity to make choices, perceive their actions, and guide them toward the good, with the ultimate good being happiness. Thus, happiness is the purpose of human life.

For Daniel Serrão, ethics should be understood as a capacity or "category" of human reflective intelligence—the human brain from a neurobiological perspective—that allows humans to make decisions after weighing values, so that the actions to be taken aim at the good, i.e., happiness. For this author, happiness is an art, and it is the art of transforming perceptions into values that are affected and shaped by the rational capacity of reflective intelligence.

Damásio believes that ethics began as one of the earliest and most glorious creations of human intelligence, as manifested in simple human behaviors, social conventions, moral rules, the sense of justice, and basic laws[8]. Ethics, therefore, for this author, is a developing project that requires knowledge and rationality, creating wisdom that operates within a culture.

However, not less important, for Damásio, ethics has origins in automatic and genetically inherited phenomena that he calls emotions with their corresponding feelings. There is, therefore, a cultural molding requiring an emotional component of ethics, but he does not reduce ethics to emotions. Ethics, in his view, is a sociocultural modulation that requires the integrity of reflective intelligence and emotional intelligence.

In this archaeobiological perspective[9], Daniel Serrão says that genetic and epigenetic information, as well as the cultural expressions presented by human beings, do not get lost in time because they do not replace each other but develop and expand. This means that when humans decided based on emotional evaluation, they did not yet know another type of evaluation, as in that distant time, there was only the perception and memorization of events as general episodes in which humans situated themselves and decided on simple behaviors, such as staying still or interacting, fleeing, or attacking.

However, when the evolution of the brain allows the intervention of the neocortex, the emotion "joy or sadness"[10] appears but is subjected to rational evaluation, richer and more complex the broader and more reflected the individual experience of living situations causing the emotion "joy." The person's decision is now enriched with evaluations of pleasant or unpleasant, favorable or unfavorable, good or bad. These evaluations, performed by the reflective capacity of rational intelligence, will transform the perception of emotion (emotional intelligence) into value. It is this transformation of perception into value that Daniel Serrão designates as ethics, the capacity of the human brain[11].

Thus, according to Serrão's thought, the human being is an ethical person when, in deciding personal behaviors, they weigh the values that have arisen from perceptions of their existence and whose meaning they have archived and memorized[12].

[8] See: Damásio, A. (2007). Neuroscience and ethics: intersections. *The American Journal of Bioethics, 7*(1), 3–7.
[9] Serrão, D. (2014). Archeobiologia e Bioética: um encontro não conflituoso. In *Diálogo e tempo. Homenagem a Miguel Baptista Pereira* (Coord. Anselmo Borges). Fundação Eng. António de Almeida, 235–264.
[10] See: Joseph, D. (2003). *Synaptic Self*. Penguin Books.
[11] Serrão, D. (2014). Responsabilização ética. *Comunicação*. Faculdade de Direito de Lisboa, October 10.
[12] Serrão, D. (2014). Responsabilização ética. *Comunicação*. Faculdade de Direito de Lisboa, October 10.

3.1. WHAT ARE VALUES?

Without resorting to extensive treatises on values, but not disregarding them, we align with Daniel Serrão when he states that value is a personal perception appreciated on the aesthetic, ethical, and rational planes. In other words, value arises from perception, from a life experience—from each individual's personal biography in their way of living and existing as a human being. That is, each human being is in the world, is part of the world, and constantly receives the world within themselves through the cerebral capacity—reflective intelligence. Perceptive, sensory, and perhaps even extrasensory activity is constantly providing us with knowledge of the world, introducing the world into us through the brain and that capacity of reflective intelligence. The treatment of this perception occurs at three levels: the aesthetic level, which tells us if the perception is pleasant or unpleasant; the ethical level, which evaluates if the perception is good or bad for us; the rational level, which decides if the perception has the form or content to be used by the logical quality of human thought.

Perception treated in this way is stored or memorized with a quality that will transform it into a value. Therefore, value is a personal perception appreciated on the aesthetic, ethical, and rational planes. In other words, as Daniel Serrão asserts, value arises from one or more life experiences.

Thus, throughout life, each of us relates to the world, to others, and in this relationship, we construct our personal and social universe of values. This intimate universe of our reflective intelligence is as rich and diversified as the richness of our relational life.

Constructed every day, this universe of values, fundamental for personal and social life, stored—like memories or gifts that are offered to us—allows each of us to use these values, after evaluation and consideration, to make decisions about ourselves, others, and society in general. By acting in this way, we are acting as ethical subjects. We are using the quality of reflective intelligence, as Aristotle described it, ethics, which allows, in the decision-making process, the weighing of personal and social values. This consideration also aims at happiness as the most desired good for human beings.

3.2. LIVING IN SOCIETY: NORMS OF SOCIAL BEHAVIOR

We stated that our life is relational and social. This means that to be happy, the relationship with others is essential. Therefore, personal ethics alone is not enough; it is necessary to have a foundation of social ethics or public morality, understood as a set of norms of behavior for the members of a society in which the goal is not to establish individual ethics, but to establish values generated by social institutions as structuring and guarantors of "social cohesion" as a primary value. Thus, the values inscribed in the social ethics of a particular society or organization apply to all its members.

The generation of values, i.e., the foundation of norms of social behavior, can occur from all its members in a process of direct democracy that accepts the rule of the majority or emanate from powers established within societies, justified by the realization of the best good for all people. In the diversity of societies, from the oldest to the most current, there is a plurality of origins of power that creates an almost insurmountable difficulty in understanding the origin of the values of social ethics or public morality.

The theoretical reflection of a philosophical nature (which we omit) led to the concept of prima facie values in developed, stabilized, and peaceful societies. For those who defend this concept, there are values that impose themselves, are accepted, and do not need to be demonstrated or voted upon; these include dignity, autonomy, freedom, justice, and well-being or happiness. These universally accepted values constitute, collectively, ethics or ethicality or public morality. A society of free people practicing justice and aspiring to their well-being and happiness is ethical—and therefore, moral.

The social ethics or social ethicality of societies is accountability. It holds accountable, first and foremost, its members whose behavior must be in line with social values and public morality; it holds institutions and society accountable to respect the values it has established as fundamental.

In summary, ethics is accountability. It holds the individual accountable as an ethical subject in their social and relational life and in the use of reason and reflective intelligence to assess their personal and social decisions. Social ethics holds institutions accountable for ensuring dignity, autonomy, freedom, and happiness as well-being. Together, individuals and institutions are mutually responsible for mutual recognition[13], to uphold freedom and justice, the supreme values of individual and social ethicality, so that humans can enjoy happiness because happiness is the goal of the individual, and ethics is the purpose, the journey, that leads the individual to happiness.

4. WHAT IS HAPPINESS?

Happiness is the right balance between the use of "reason and emotion." It is the capacity that aspires to an "intelligent heart" and not to a "heartless intelligence"; it is the just adequacy between material and intellectual goods[14]. In other words, it is a successful life, not a life of success. Success creates happy moments, but the moments that give us pleasure are not sufficient for a happy life.

Happiness requires the capacity for measurement. It means that there is a need for consideration and prudence in the actions and deeds we undertake. Consideration in evaluating the values present in a particular situation in which we find ourselves, and prudence in choosing the correct action. If ethics aims at happiness, then we must ask the question: what is the right action to take in a situation in which I am involved to do good?

Aristotle helps us find this answer through the capacity and self-control of reason, as it is in reason that the fundamental dispositions to be sensible or courageous are found, dispositions that we should allow ourselves to listen to and obey. Therefore, the capacity for reason is, in a sense, a guide that we should listen to in order to achieve the excellence that ethics seeks in our actions.

According to the same author, excellence comes in two forms: theoretical and practical. Wisdom, understanding, and insight, for example, are theoretical dispositions; generosity and temperance (moderation or prudence) are ethical dispositions. Thus, excellence has a dual function: first, as a theoretical disposition—reflective intelligence or comprehensive thinking; second, as an ethical disposition, a permanent character disposition to act well.

However, it is important to note that no ethical excellence (virtue) is born with us by nature; they are learned and acquired through teaching, through a learning process to embrace and perfect them. That is, we become just by practicing justice; we become temperate—moderate and prudent—by practicing temperance; we become courageous by performing acts of courage. But before practicing justice and being just, we must know what justice, temperance, and courage are.

Therefore, by understanding and cultivating these dispositions of excellence (virtues)—both theoretical and ethical—we are capable of acting well in a situation in which we may be involved. Acting with temperance, we are prudent and considerate; acting with courage, we are daring but not cowardly; acting with justice, we are just because the just person acts in a measured way in their specific situation, seeking the most appropriate means for the realization of the good, which is the purpose of ethics—happiness.

In other words, ethics teaches us to understand that happiness, the good we all desire, is not found in extremes but in the mean—the appropriate middle. What we want to affirm is that, according to Aristotle, there are three main

[13] Honneth, A., & Ganahl, J. (2014). *Freedom's Right: The Social Foundations of Democratic Life*. Columbia University Press.
[14] Cognitive intelligence and emotional intelligence.

ways of living life. One understands happiness as pleasure; the other is dedicated to practical action to obtain certain honors—to be honored is a good end. But honor, when sought as the extreme pursuit of happiness, can be only a superficial good because when we lose honor, we also lose happiness. Living pursuing honor, with prudence, is healthy because honor aims at excellence, and excellence, in this sense, is more powerful than honor, as excellence is the goal of social and political life. Finally, life as contemplation—intellectual action of an intelligent heart—seems to be the form in which the other two forms of life can be adequately and justly combined for success in the pursuit of happiness.

Thus, happiness is the supreme good we all seek; it lies in how we ethically act during our life, rejoicing in noble actions and feeling happy with the just way of acting. The excellence of action tends to achieve the supreme good, which is happiness. Happiness is, in Aristotle, the sweetest part of life, and to live happily is to love what one loves because those who love know to whom and how they give their love.

In Kant, happiness comes through the dignity of being happy. That is, being worthy of such happiness. This is the consonance of all our maxims with moral law. This consonance objectively conditions the alignment of the desire for happiness with reason. The promotion of the happiness of others, like our own, has as its end the establishment of mutual assistance among human beings and should thus be considered a universal moral duty[15].

From this, we can extract that if in Aristotle happiness is the purpose of ethics; in Daniel Serrão, the human being is inhabited by a desire for happiness because the heart remains restless until it rests in it; for Kant, the promotion of happiness is a universal moral duty. Three perspectives that do not nullify each other but complement themselves—eurhythmia. In the heart of man dwells the desire to be happy, and the path to happiness is only possible by avoiding fragile forms of happiness[16].

4.1. FRAGILE FORMS OF HAPPINESS

Ethics urges us to avoid the “fragile forms of happiness” because, even if we cannot entirely avoid them, they are ephemeral. Material wealth, social or political power today is nullified by another tomorrow; momentary pleasure, for example, is important, but more crucial is the wealth of ethical and moral values through which we construct a successful life.

All fragile forms of happiness make the intelligent heart of a person restless. Augustine of Hippo stated that “our heart is restless until it rests in God.” We affirm, as Daniel Serrão does, that the intelligence of the heart remains restless until it embarks on the ethical journey towards happiness. Therefore, happiness will be the tranquility and security of the intelligence of our heart, resulting from reflective intelligence, perceptive awareness of human life and action, and the generation of values arising from the same actions and their transformation into aesthetic, ethical, and rational values[17].

[15] Silva, C. (2012). O conceito de felicidade na filosofia moral kantiana. Principais considerações. *Revista da Faculdade de Letras — Série de Filosofia, 29*(20), 119–131.
[16] Serrão, D. (2014). Responsabilização ética. *Comunicação*. Faculdade de Direito de Lisboa, October 10.
[17] Serrão, D. (2014). Responsabilização ética. *Comunicação*. Faculdade de Direito de Lisboa, October 10.

5. ETHICS, ENTREPRENEURSHIP, AND HAPPINESS

The relationship between ethics and entrepreneurship is substantial for the entrepreneur's ideas to truly address the aspirations of humanity. In the late 20th century, the emergence of entrepreneurship in the social, cultural, and economic spheres gained prominence in the media and educational policies, generating the idea that entrepreneurship carries competitiveness as a catalyst for society—organizations and individuals.

In the social context, particularly in the field of social sciences, it is emphasized that entrepreneurship is essential for improving living conditions and personal development. In the economic realm, some authors admit a neoliberal view of entrepreneurship - competitiveness. Recent studies highlight a clear relationship between individuals and entrepreneurship, where one can observe the view of humans as producers of themselves, characterized by initiative, future projection, reflective and flexible intelligence, risk-taking, and, of course, competitiveness. According to this idea, in our perspective, entrepreneurship seems to give way to a competitive spirit, surpassing the collaborative spirit.

The dominant discourse of entrepreneurship presents itself as a set of personal attributes where efficiency, effectiveness, and competence indicate those who achieve personal and professional success in this domain due to their competitive ability. This notion, detached from an ethical commitment, seems to assert that to be an entrepreneur and succeed—personal satisfaction and happiness—competitive determination is consecrated instead of the necessary and always healthy cooperative and collaborative relationship.

It is also noteworthy that the entrepreneurial discourse brings with it the idea of happiness and salvation; freedom and autonomy as a certain telos, in the sense of occupying a strategic place in guiding the behavior of the person who undertakes oneself. The human being—the individual—centered on oneself sees oneself as an actor seeking to 'entrepreneur' one's life and oneself.

In this sense, for the entrepreneur to enjoy happiness and salvation, the notion of speed, of being the first, seems to be imperative. Waldo Emerson, cited by Zygmunt Bauman (2010), presents Ralph's metaphor of thin ice: "When skating on thin ice, salvation lies in speed. Whoever wants to be saved must move at the necessary speed to avoid risking overstressing the resistance of any point." And the author concludes: "In the volatile world of liquid modernity [...], walking is better than sitting, running is better than walking [...]." However, the entrepreneur's path cannot be solitary but supportive. Arriving quickly, being the first to achieve success does not necessarily mean being successful. Success, as we have already mentioned, can bring happy moments, but it is not happiness. The happiness of the entrepreneur is broad only to the extent that the impact of their work on society is broad; the entrepreneur's mission is to create added value not only for oneself but to generate value with ethical significance and positive social and economic impact.

5.1. ETHICAL VALUES TO ATTRIBUTE TO ENTREPRENEURSHIP

Entrepreneurship has gained importance in society. Currently, its moral valorization is based on the idea that entrepreneurship is an axiological virtue. It is already a culturally and socially experienced value in society, akin to the universal values we consider fundamental for humanity. Therefore, entrepreneurship, as a new "value," indicates a system of ideas, truths, beliefs, traditions, principles, purposes that act interdependently and are sustained by social groups whose practice should be disseminated, preserved, and encouraged in schools and universities.

As a purpose, entrepreneurship must respond to a need and not create its own necessity. Even assuming entrepreneurship as a virtuous value, it does not have the whole truth. In this context, ethical values, and principles attribute to entrepreneurship a social and economic mission that involves:

1. Innovation of a good, service, or business model that allows not only the creation of wealth but also the wealth of values, always based on the ethical principle of transparency;
2. Positive impact on the local ecosystem that allows greater value and lower cost, ensuring equity as the ethical principle of social and economic balance;
3. Dissemination of best practices and their replicability in other contexts, promoting an ethic of solidarity;
4. Sharing of knowledge, training, and information for the incubation of sustainable projects, with a view to the principle of autonomy;
5. Creation of effective partnerships that promote the strengthening of gains, valuing the principle of responsibility.

The impact that innovation causes, both in the economy and in the social, cultural, and political reality driven by the above-mentioned ethical values and principles, shows that entrepreneurship as an instrument of change cannot be immune to codes of ethics and conduct and must be guided by respect and compliance with norms and laws. If the ideal of the entrepreneur is based on the principle of innovation—always desirable—the ethical principle of caution—always healthy—cannot be absent.

5. FINAL REMARKS

From what has been discussed, we can deduce that if we live using our ethical capacity of reflective and perceptive intelligence, we will be capable of generating happiness within ourselves that is aesthetic, ethical, and rational.

Aesthetic, because it shows us the beauty of what is beautiful and the beauty that exists within us. Ethical, because it informs us about what is good, what is good within us, and the good we do. Rational, because we act with freedom and autonomy.

It is the autonomy and freedom of the human being that, from its origin, bestows upon it the dignity of being a person, intrinsic because it resides in the ontological reason of the person—in its most intimate self-awareness; inherent because it constitutes the ontic reason of the nature of the human being. Man has, in his intelligence, a law written by the intelligent heart itself; his dignity lies in obeying it, and by it, he will be judged. Consciousness is the most secret center and sanctuary of man, where he is alone with his self-awareness, whose voice is heard in the intimacy of his being[18].

Therefore, from the origin of human life, dignity is inscribed in the heart of man. It is dignity that grants him freedom and autonomy. The worthy man acts in accordance with his autonomy due to his freedom. From this autonomy and freedom arises his self-determination, which gives him the power to exercise and fulfill, ethically, and no other, the choices he makes as a person.

Those who act ethically always seek not the greater good but the better good. Ethics is then the journey to be happy, as Aristotle suggests, to attain the supreme good—eudaimonia—happiness; and as Kant implies, a universal moral duty to be worthy of being happy.

Indeed, ethics is the reason for our happiness; happiness is the highest ethical form of being free and morally responsible.

[18] Cf. *GS, 16* (A dignidade da pessoa humana, Constituição Pastoral Gaudium et Spes.)

From what has been said, we can deduce that if we live using our ethical capacity of reflective and perceptive intelligence, we will be able to generate happiness within ourselves that is aesthetic, ethical, and rational. Aesthetic, because it shows us the beauty of what is beautiful and the beauty that exists within us. Ethical, because it informs us of what is good, what is good within us, and the good we do. Rational, because we act in freedom and autonomy.

It is the autonomy and freedom of the human being that give them, from their origin, the dignity of being a person, intrinsic because it resides in the ontological reason of the person—in their most intimate intimacy, their self-awareness; inherent because it is a constituent of the ontic reason of the nature of the human being. Man has in his intelligence a law written by the intelligent heart itself; his dignity lies in obeying it, and by it, he will be judged. Consciousness is the most secret center and sanctuary of man, where he is alone with his self-awareness, whose voice is heard in the intimacy of his being.

Therefore, from the origin of human life, dignity is inscribed in the heart of man. It is dignity that grants him freedom and autonomy. The worthy person acts according to their autonomy because of their freedom. From this autonomy and freedom arises their self-determination, which gives them the power to exercise and accomplish, ethically, and no other, the choices they make as individuals.

Those who act ethically always seek not the greater good but the better good. Ethics is then the journey to be happy, as Aristotle refers, to achieve the supreme good—the eudaimonia - happiness; and as Kant alludes, a universal moral duty to be worthy of being happy. Indeed, ethics is the reason for our happiness; happiness is the highest ethical form of being free and entrepreneurial and morally responsible.

The entrepreneur's action should always seek the better good (happiness) and promote the greater good (a moral duty). Thus, we can conclude that, by analogy, entrepreneurship and innovation also require ethical endeavor for the activity of entrepreneurship and innovation to be fair and equitable, transparent and responsible; supportive and autonomous. It is up to the entrepreneur to assume the role of a leader in the organization of innovation, promoting strategies based on cooperative sensitivity and not just competitiveness, thereby fulfilling the dictates of ethical values because ethics as the science of behavior that seeks happiness will give them the happiness of the good they produce (economy) and the social good (social responsibility) they achieve as members of society.

The entrepreneur needs the unification and rationalization of knowledge that historically occurred in the past: technical and innovative work was characterized by the search for greater efficiency. That is, it sought efficiency by modifying not so much the tool but the manual skill of man. Currently, two senses run through the idea of entrepreneurship: in a negative sense, the relationship of the person with innovation is lost; in a positive sense, the global level of innovation is gained, where the entrepreneur decides on the criteria of maxims—efficacy and efficiency. Everything that is possible is obligatory, and all obstacles must be overcome.

The modern mindset based on technological entrepreneurship proclaims the insignificance of limits. The ontological and axiological emptiness of human nature surpasses the human condition. Human nature is our essence that is distinct from the human condition. Thus, the human condition must respond to what human nature requires for its survival and development.

Therefore, in the "art of entrepreneurship," we should ask what, in practice, are the innovations that are peripheral and those that attack our identity.

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AI'S IMPACT ON HUMAN RIGHTS: THE NEED FOR LEGAL EVOLUTION

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ABSTRACT

This contribution explores the complex intersection between Artificial Intelligence (AI) and human rights, highlighting the challenges and opportunities that arise as AI becomes increasingly prevalent in society. Beginning with a reference to the Universal Declaration of Human Rights (UDHR) of 1948 and its legal ramifications, the paper delves into how AI emulates human intelligence, impacting people's lives and rights. The debate surrounding the need to adapt human rights protection laws to technological innovations is examined, with some authors advocating for legal changes, while others argue for an evolution of existing legislation. The literature review details various legal and ethical concerns related to AI, such as algorithmic transparency, discrimination, cybersecurity, privacy, and accountability. The contribution underscores the complex relationship between AI and human rights, identifying significant challenges that require careful analysis. This contribution seeks to contribute to the understanding of these evolving issues, emphasizing that the discussion is still in the exploratory stages in an increasingly technology-driven world intersecting with human rights.

KEYWORDS: Artificial Intelligence (AI); Ethics; Human Rights; Legislation; Vulnerability.

SETTING THE STAGE: AI, HUMAN RIGHTS, AND LEGAL EVOLUTION

The Universal Declaration of Human Rights (UDHR), adopted in 1948 after World War II, is a crucial defense of human rights, applicable to all individuals regardless of nationality, race, religion, or origin. It covers civil and political rights, economic, social, and cultural rights, and collective and solidarity rights.

The UDHR's principles are upheld and expanded upon by international treaties and conventions. Notable examples include the International Covenant on Civil and Political Rights, which focuses on civil and political rights, and the International Covenant on Economic, Social and Cultural Rights, which addresses economic, social, and cultural rights. Other conventions deal with racial discrimination, gender equality, torture prohibition, children's rights, rights of persons with disabilities, rights of migrant workers, and the establishment of the International Criminal Court to address serious crimes like genocide and war crimes.

These legal instruments complement and strengthen the foundation of International Human Rights Law (IHRL), protecting and promoting a wide range of rights worldwide. However, seventy-five years after the ratification of the UDHR, the development of Artificial Intelligence (AI) presents new challenges. Indeed, according to López-Sánchez et al. (2023), AI emulates human intelligence, enabling machines to think, learn, and solve problems similarly to humans. In practice, the phenomenon of AI translates into a complete technological disruption (Henman, 2020) that substantially impacts people's lives and, most importantly, their rights (Rowena, 2020).

As a result, a significant discussion emerges regarding the need to update IHRL to address these changes. In this context, while some argue for changes in laws in response to technological disruption (McGregor et al., 2019; Liu and Zawieska, 2020; Decken, 2020; European Commission, 2021), claiming that current legislation is inadequate, arguing that when the UDHR was adopted in 1948 as a fundamental human rights law, the challenges of AI could not have been imagined. Consequently, they contend that there are no provisions in human rights protection laws that are sufficiently effective in addressing the new risks posed by technological innovations. Others, although concurring with the need for change, disagree with the second assertion (Bublitz, 2022). Bublitz (2022) acknowledges that AI was unknown at the time of drafting the UDHR. However, Bublitz (op. cit.) still challenges the lack of effectiveness, noting that the law remains dynamic through subsequent statutes, as listed above, and furthermore adds that the law can apply even in cases where lawmakers did not foresee significant contextual changes due to the abstract and general nature of human rights norms, especially. Thus, according to Bublitz (2022), changes must occur, but instead of invoking new human rights, existing rights should be developed in response to changes in social circumstances and technological possibilities.

Thus, contributors' perspectives seem to fall between being for or against the need to protect human rights in the face of AI challenge, but it appears to be primarily a matter of semantics, as all agree on the need for changes. Furthermore, laws are drafted, interpreted, and applied by agents exposed to social changes and contemporary activism, so judicial decisions are ultimately shaped by the influence of current phenomena and insights from academic research.

In this way, scholars and organizations appear to agree on the need to update IHRL to address the specific challenges of AI with respect to human rights. However, this discussion is still in an exploratory stage, in contrast to the rapid advancements in AI technology, which are becoming increasingly intertwined with human rights and shaping the common future.

RESEARCH METHODOLOGY: MAPPING THE AI-HUMAN RIGHTS TERRAIN

This contribution presents qualitative research on AI and human rights through a narrative and analytical literature review approach, characterized by descriptive and interpretative synthesis of previous studies from various sources, such as books, papers, and government documents. This procedure aims to deepen the understanding of key issues, arguments, and perspectives surrounding the intersection of AI and human rights. Study and presentation of scholar arguments that support convergent and divergent views on the relationship between AI and human rights. This indicates a critical analysis of opinions and arguments expressed in different sources. Subsequently, a comprehensive synthesis of various topics and issues related to AI and human rights was developed. This process involved collecting and organizing relevant information from multiple sources to create a panoramic view of the subject. This synthesis approach contributes to understanding the complex interactions between AI and human rights, highlighting the variety of aspects involved in this intersection.

DEFINING OBJECTIVES: NAVIGATING AI'S IMPACT ON RIGHTS

Therefore, the essential objectives of the essay are:

1. Explore the complex intersection between Artificial Intelligence (AI) and human rights, analyzing how AI affects people's lives and their rights while highlighting the challenges and opportunities associated with this relationship.
2. Investigate the debate surrounding the need to adapt human rights protection laws to technological innovations, examining different perspectives on whether existing legislation is adequate or requires updates to address AI risks.

3. Contribute to a deeper understanding of the complex issues involving the interaction between AI and human rights, emphasizing that this discussion is still in exploratory stages in a world increasingly shaped by the intersection of technology and human rights.

EXPLORING LEGAL AND ETHICAL DILEMMAS IN AI APPLICATIONS

In a context permeated by the ubiquitous spread of AI, as discussed by Boden (2016), increasingly pressing concerns emerge regarding human rights. These concerns, while coexisting with the undeniable benefits of AI, focus on the potential adverse repercussions this technology can have on the most vulnerable segments of society, either by exacerbating pre-existing conditions of vulnerability or by instigating the emergence of new vulnerable groups.

In this framework, several authors decode dangers and emphasize the urgent need for supervision and regulation, even at the risk of redundancy, to avoid serious failures. In this regard, Liu and Zawieska (2020) warn that algorithms and AI can seriously violate human rights, such as privacy concerns, discrimination and bias, lack of accountability and transparency, job displacement and freedom of expression. Thus, advocating for the establishment of a legal framework based on human dignity to ensure their accountability. According to Liu and Zawieska (2020), this framework should replicate critical regulatory functions to enhance reliability, even in its early and imperfect stage. The authors advocate for a teleological perception of the human being, considering humans as valuable in themselves, not merely as a reference point for robotics and AI.

In the same line, McGregor et al. (2019) argue for the need to create a legal framework based on International Human Rights Law (IHRL) to address the harms caused by algorithms, covering their entire lifecycle, to balance innovation and the protection of human rights.

Furthermore, Gerke et al. (2020) examined AI in healthcare in the United States and Europe. They concluded that the United States has a more liberal approach, with AI products already available. It is anticipated that AI will have a significant impact on the global economy by 2030, with China and North America leading the way. On the other hand, Europe stands out for its global influence on AI ethics, with the European Commission's Ethical Guidelines for Trustworthy AI being a milestone. They explored four ethical challenges in healthcare, including consent, safety, fairness, and data privacy. Additionally, they discussed legal challenges in the United States and Europe, such as security and intellectual property. In their conclusions, they emphasized the need for collaboration among all stakeholders, including AI manufacturers, patients, and regulators, to ensure ethical and legal implementation of AI in healthcare. Public trust, informed consent, data privacy, cybersecurity, algorithmic fairness, transparency, and effective regulation are essential. They also highlighted the importance of public and policy discussions centered on the ethics of AI-based healthcare and its impact on society and the workforce.

In a broader context, Rowena (2020) provides a comprehensive overview of AI applications that raise serious legal questions related to factors determining and/or facilitating vulnerability. Among these, the author lists the lack of algorithmic transparency, which can compromise fair judgment, due process, social rights, and access to public services, along with the integrity of free elections. Cybersecurity vulnerabilities threaten the right to privacy, freedom of expression, and the free flow of information. Injustice, bias, and discrimination affect a range of rights, including non-discrimination, gender equality, children's rights, and the rights of migrant workers, with implications for the right to life, freedom, and a fair trial. Lack of contestability undermines the right to effective remedies and access to justice. Issues related to legal personality and moral agency intersect with the right to be recognized as a person before the law, equality, and non-discrimination. Intellectual property issues affect property rights, cultural participation, and the benefits of scientific advances. Adverse effects on workers impact social security, employment rights, and wage equality, while privacy and data protection issues concern the right to privacy, family life, and the protection of vulnerable individuals. Questions of liability and lack of accountability for AI-induced harms jeopardize the right to life and access to effective remedies, emphasizing the complex relationship between AI and human rights.

Thus, as can be observed, the relationship between Artificial Intelligence (AI) and human rights is complex and multifaceted. AI applications can provide gains and efficiency, and have very positive impacts on people's lives, but can also generate negative impacts on various civil, political, economic, social, and cultural rights if not supervised and regulated.

In this context, Raso et al. (2018) note that the adoption of the Universal Declaration of Human Rights (UDHR) three-quarters of a century ago provides a strong framework for addressing past and present errors, ensuring a future that respects the rights of all. Assessing the impact of our actions on the rights of third parties is crucial, as highlighted by the Guiding Principles, which emphasize due diligence before and during the implementation of new technologies. While AI companies increasingly recognize their responsibility for human rights, governments play a fundamental role. In addition to being creators and implementers of AI, they are also responsible for protecting human rights under international law. Government participation is essential in defining solutions to human rights violations and managing the distribution of the benefits and burdens of AI in society, a legitimate task only for democratic governments.

ANALYZING FINDINGS: AI'S COMPLEX RELATIONSHIP WITH HUMAN RIGHTS

According to this review, regulation is an important mechanism for protecting human rights. In fact, in the era of AI, regulation can be used to ensure that AI systems are developed and used responsibly, preventing violations of human rights.

Indeed, most authors and organizations agree on the need to update International Human Rights Law (IHRL) to address the specific challenges of AI in relation to human rights. For example, Liu and Zawieska (2020) warn that algorithms and AI can seriously violate human rights, so they advocate for the establishment of a legal framework based on human dignity to ensure their accountability.

Regulation based on IHRL can help protect human rights in AI by ensuring that AI systems are developed and used ethically and responsibly. For example, regulation could focus on transparency, compliance, and governance requirements for AI systems.

In the realm of ethical research and development, this contribution highlights the importance of guiding AI research with ethical principles that prioritize respect for human rights. This aligns with the perspective of authors like Raso et al. (2018), who emphasize the importance of due diligence before and during the implementation of new technologies. Ethics plays a crucial role in the responsible development of AI.

Furthermore, the impacts on human rights are manifold, as mapped out by Rowena (2020) and then detailed in different areas by various authors. Notable are the impacts of AI on privacy and security. AI is often used to collect and process large amounts of personal data. This can have significant implications for people's privacy and security. Regulation can help protect people's privacy and security by requiring AI systems to be transparent about how they collect and use personal data. For example, regulation could require that AI systems be designed to safeguard the privacy of personal data and that personal data be used only for the purposes for which it was collected.

The paper also emphasizes the need for education and awareness about the impacts of AI on human rights. This perspective is supported by authors like Rowena (2020), who discusses issues of injustice, bias, and discrimination caused by AI and how these issues affect various rights. Education of the public and AI professionals about these ethical and legal issues is crucial to mitigate these negative impacts.

Regarding corporate responsibility, the literature highlights the role of companies developing and implementing AI in protecting human rights. Authors like McGregor et al. (2019) argue that international human rights law should serve as a framework for corporate responsibility regarding AI. This means that companies should acknowledge their

responsibility and take steps to ensure that their technologies do not violate human rights. This approach is essential to ensure that companies are aware of their impact on society.

Finally, the importance of government participation in formulating solutions to human rights violations and managing the distribution of the benefits and challenges of AI in society is emphasized. This is a role particularly suited to democratic governments, such as those in the United States and Europe, with a particular emphasis on ethics in Europe (Gerke et al., 2020).

CHARTING THE FUTURE: AI AND HUMAN RIGHTS IN AN EVOLVING WORLD

In conclusion, the complex interaction between Artificial Intelligence and human rights is an ever-evolving reality. This dynamic relationship is characterized by challenges and opportunities that demand immediate attention and ongoing reflection.

The complexity of the relationship between AI and human rights is evident because AI can both benefit our rights and pose potential threats. This ever-changing intersection challenges us to understand and address complex ethical, legal, and social issues.

In this context, it is imperative to reflect and act. Governments must act promptly to ensure that AI is developed and applied ethically, protecting human rights. This requires effective regulation, corporate accountability, research guided by ethical principles, and public education.

At the same time, it is essential to recognize the importance of adapting International Human Rights Law to address technological innovations. The fundamental principles of human rights must remain robust, even in the face of rapid technological change, ensuring that the protections extended to individuals are effective in the context of AI.

Furthermore, society must seek a balance between technological innovation and the protection of human rights. AI has the potential to bring significant advancements, but this progress should not come at the expense of human rights and dignity. Responsible AI development must be a priority.

Lastly, it is important to note that this discussion is just beginning. The intersection of AI and human rights will continue to evolve as technology advances. Therefore, ongoing reflection and open dialogue are crucial to shaping the future ethically and justly. Only through continuous commitment to these issues can we ensure that AI benefits society while fully respecting the universal principles of human rights.

THEORETICAL IMPLICATIONS

1. Evolution of International Law: The paper points to the need to adapt IHRL for the era of AI. This raises theoretical questions about how fundamental principles of human rights can be applied to new technologies and contexts.
2. Philosophy of Human Dignity: The essay highlights the importance of human dignity as a basis for AI regulation. This raises theoretical questions about how the philosophy of human dignity can be incorporated into laws and policies related to AI.
3. Ethics of Innovation: The debate about the ethics of AI and its impacts on human rights raises theoretical questions about how to balance technological innovation with the protection of human rights. This requires a deep discussion about the role of technology in society.

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FROM BIG DATA TO SMART DATA. OPPORTUNITIES FOR ENTREPRENEURS USING DATA SPACE ECOSYSTEM APPROACH

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ABSTRACT

This paper is a theoretical and conceptual approach for entrepreneurs that would like to create new business based in the context of the European data strategy. The paradigm shift is happening, data reveals that we are passing from consuming a data volume of 33 zettabytes in 2018 to 175 zettabytes in 2025. In order to demonstrate the value of Data Space technology for entrepreneurs it has been applied a literature review methodology. For newly emerging topics (such as Data Space) the purpose is rather to create initial or preliminary conceptualization rather than review old big data concepts. One of the key insights of the present article is to confirm how data's increasing ubiquity and abundance makes is vital in every sector, and businesses of every size are becoming more dependent on data management. In the case of Data Space technology there is a clear problem between technology itself and its business application or business model and therefore we have a knowledge gap. Thus, it is necessary to spread out the Data Space concept to the entrepreneur's ecosystem so their flexibility and speed in order to adapt or create new business could help reducing the mentioned technology-knowledge gap (how to monetize or create new business models). In order to demonstrate the value of the technology and derivate business opportunities for entrepreneurs this theoretical review presents the basic concept of Data Space and its association with MDVC (multilateral data value chain) development in different sectors.

KEYWORDS: Business Innovation; Data Economy; Data Space; Entrepreneurship; Network.

1. INTRODUCTION

The principal aim of this conceptual review paper is to explain the potential business associated to a new complex technology in easy way for entrepreneurs. The main idea is to have a global context of what is happening at EU policy level and global investment view. Then the main concepts associated to Data Space Technology has been presented so the entrepreneurs could explore the necessity of new business models (to reduce the actual gap between the technology and the business).

1.1. EU CONTEXT

There is currently active a 4 to 6 billion investment in common European data spaces and European federation of cloud infrastructure services. In terms of the value of data economy (EU27) it will be an incremental growth from 301 billion (2018) to 829 billion in 2025. Even the number of data professionals will be double from 5.7 million to 10.9 million of people. So, there is no doubt about the potential market from different perspectives.

1.2. CONCEPT APPROACH AND IMPORTANCE FROM BUSINESS PERSPECTIVE

Some argue that the provision of digital infrastructure is a shared societal service in the same way as water, sanitation, education, and healthcare (Curry and Scerry, 2022). On the other hand, Data economy is defined as a global digital ecosystem in which data is gathered, organized, and exchanged by a network of companies, individuals, and institutions to create economic value (Sestino et al., 2023). So, it is evident the importance of sharing data. We

also know that the pace of technological change is much faster now than it has been in the past, and Data driven economy is a reality that is developing every day. Data driven economy is catalysing a change in data processing forms. In 2018 data management was centralised in 80% and smart connected objects where 20% while in 2025 this situation will be the opposite, there will be 80% of smart connected objects while only 20% of centralised computing facilities (EU Data Strategy 2020).

The actual entrepreneur needs to understand data environment as a sociotechnical ecosystem enabling value to be extracted from data value chains supported by interacting organizations and individuals (Fraunhofer 2017). It is important to note that economic value arises not from the data's content, but from combining different data sources in a way that meets the customer's needs. That said, profitable business models do not rely on selling access to data. In many cases, startups and SMEs are looking to disrupt markets by publishing and managing data. We are living a big digital transformation era. The data Governance Act approved by EC to boost data sharing is essential for the manufacturing industry. The 80% of industrial data is never used. We still have in our brain the misconception that set of data has only one use. Nowadays the potential of data access and sharing will help companies to create and develop new products and services.

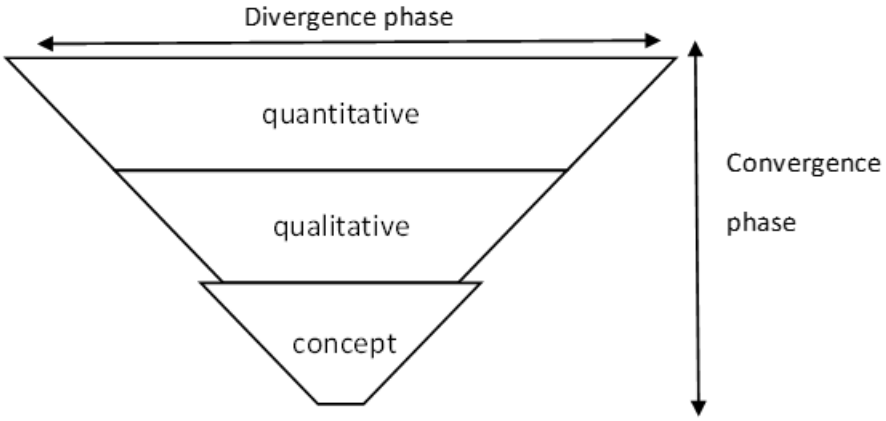
1.3. THE CASE OF MANUFACTURING INDUSTRY

The potential value of manufacturing industry data sharing has been estimated at €83 billion just in the field of process optimisation and better leveraging machine-generated data can lead to up to 20% improvements in material resource efficiency. The total value that companies can create in five key areas of data sharing is estimated to be more than $100 billion according to World Economic Forum white paper. (WEF, 2020). Conceptually the value for stakeholders derived from data sharing services in manufacturing industry will be in asset resilience, asset energy efficiency, optimised OEE (machine efficiency) and asset lifetime.

2. METHODOLOGY

This paper has been developed within the context of literature review methodology. The method has been dived in two main stages (See figure 1). The stage number one is called divergence and consists in doing an extensive literature review of the covered topic-issue (research papers, web references, white papers, or any valuable reports as result of European research projects). This stage it is more related with the classical systematic qualitative and quantitative approach (divergency phase).

FIGURE 1: Literature review methodology.



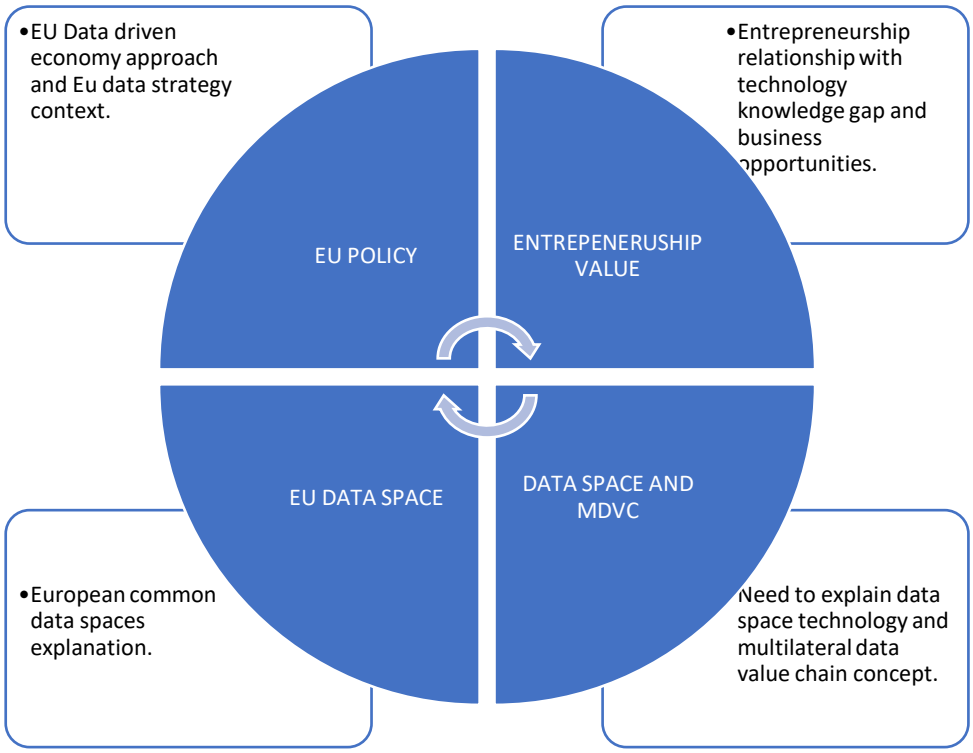
The second stage is known as the integrative theoretic framework. The main characteristic of this stage is to make valuable insight summary of the previously analysed literature (main ideas and concepts associated to the covered

issue in the paper). The synthesizing process is called the convergence phase and in this stage is essential the critique and potential modelization framework.

3. RESULTS

After the divergency phase there has been read 35 research papers, 12 online references, 4 EU projects (digital Europe) and 10 reports. To be able to sum up the findings it has been decided to make a concept map in these has been the base to develop the sections of the paper regarding data space technology. The next figure (figure 2) is summary of the main ideas or results derived from the literature review.

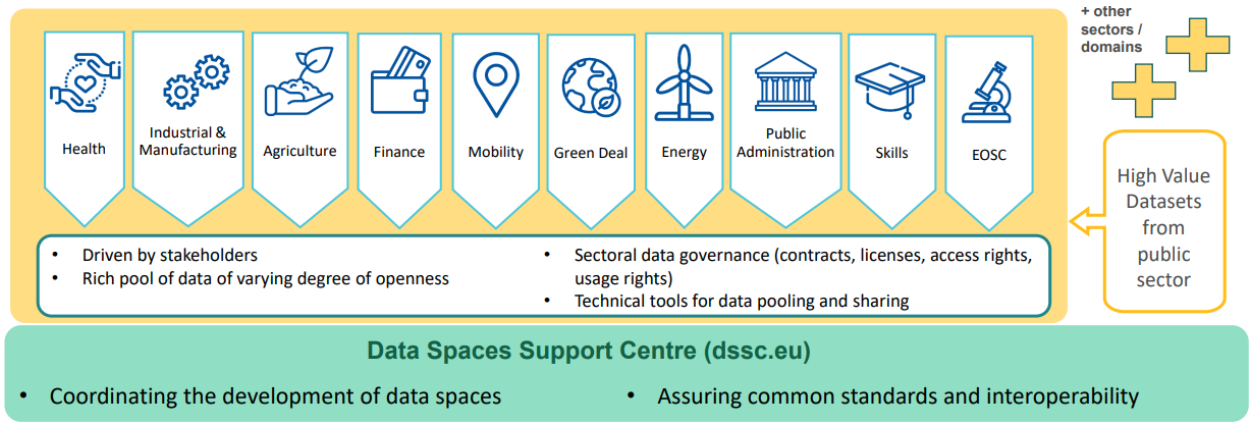
FIGURE 2: Mind map of the literature review.



3.1. COMMON EUROPEAN DATA SPACES

The creation of EU-wide common, interoperable data spaces in strategic sectors (see figure 3) aims at overcoming legal and technical barriers to data sharing by combining the necessary tools and infrastructures and addressing issues of trust by way of common rules. A common European data space brings together relevant data infrastructures and governance frameworks in order to facilitate data pooling and sharing (EC, 2002).

FIGURE 1: European Data Spaces Strategic sectors.



SOURCE: EU data strategy.

In the Commission's data strategy, diverse data spaces were proposed, ranging from industry to energy, and from health to the European Green Deal. They will, for example, contribute to the green transition by improving the management of energy consumption, make delivery of personalised medicine a reality, and facilitate access to public services.

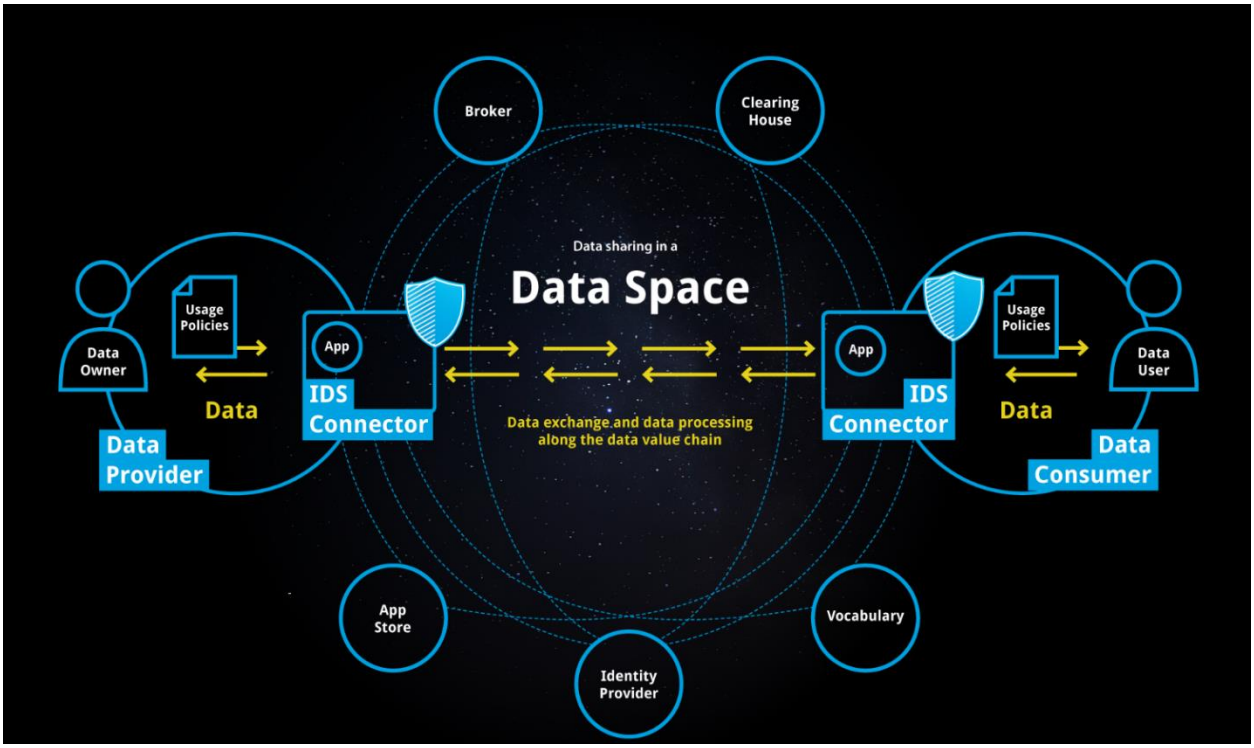
Common European data spaces will allow data from across the EU, both from the public sector and businesses, to be exchanged in a trustworthy manner and at a lower cost, thereby boosting the development of new data-driven products and services. Data spaces are composed of both the secure technological infrastructure and the governance mechanisms.

3.2. THE DATA SPACE CONCEPT

As we look to the evolution of data-driven innovation, Data, in particular large quantities of high-quality data, is critical to creating competitive smart solutions for companies. With few exceptions, our current large-scale data infrastructures are beyond the reach of small organizations that cannot deal with the complexity of data management and the high costs associated with data infrastructure.

The modern economy is developing based in a technology-concept called Data Space and therefore data driven entrepreneurship and data driven business opportunities are inevitably associated to it. A common European data space will ensure that economies and societies have access to more data while preserving the power of communities and people to create. In the actual socioeconomic context, the big industrial players are transforming their business into a full vertical and horizontal integration of systems and components (Rojko et al., 2017). Applying data space concepts in companies will make them more competitive and flexible in the face of any change in the market. It is important to have innovative services such as predictive maintenance or process autonomy. In order to clarify what a data space is, see figure 4 (data space components and framework).

FIGURE 4: Data Space components.



SOURCE: IDSA (International Data Space Association).

The main idea is that a data space is defined as a federated ecosystem based on shares policies and rules. Basically, it is a decentralized infrastructure that enables diverse actors to share and use data in a secure, reliable, and trustworthy manner, following common governance, organizational, regulatory, and technical mechanisms (JRC, 2020).

Correlated to data space technology there is a new approach to value chain. The concept for companies to adopt the data perspective and to optimize data usage, can be found in the field of Big Data by setting up sophisticated data value chains (DVC) (Jony et al., 2016). SMEs need to understand the concept of the data value chain as early as possible and start playing the game as soon as possible. One promising embryonic data space project for Spanish and Portuguese companies is BAIDATA project. The BAIDATA Association is helping to drive the development of data sovereignty and the data economy. Founded in collaboration with the International Data Spaces Association (IDSA), BAIDATA implements research, development and training activities to help build the public-private data ecosystem at Iberian Peninsula scale.

On the other hand, it is important to note the DVC approach from strategic point of view. It helps in value creation (Faroukhi et al., 2020) and integrates all steps that affect data starting from data generation and collection and ending with the possibility of decision-making based on data output (Kasim et al., 2012; Miller et al., 2013.).

The amount of data from various distributed sources is growing rapidly which creates significant opportunities to gain valuable insights. Data ecosystems can create conditions for market competition between participants or enable mutually beneficial cooperation between different and interdependent participants. Dataspaces can provide a clear framework to support data sharing within a data ecosystem.

3.4. BUSINESS OPPORTUNITIES FOR ENTREPRENEURSHIP-STARTUP ECOSYSTEM

The fall in the number of start-ups accelerated in 2021, falling by 60% in the European Union, the United Kingdom and the United States (EC, 2022). However, the number of start-ups rose somewhat in 2021 in Germany in knowledge-intensive services sectors, after a trend decline since the early 2000s (Deutsche Bundesbank, 2022).

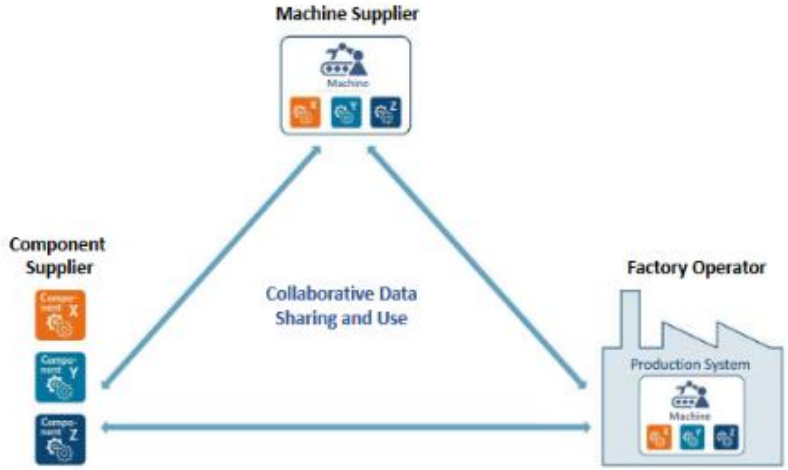
There is gap and an opportunity to recover the innovation path for the rest of European countries. The missing start-ups can worsen long-term productivity developments. Historically severe recessions have often been associated with the loss of a generation of startups or poor growth performance of those that survived. The impact is expected to be small in the short term but since start-ups make up only a small part of the business their absence has a long-term impact on productivity as these start-ups often play a key role in competitive innovation. (Kolev et al., 2022) and/or in diffusing new technologies and business models (Criscuolo, Gal and Menon, 2016). Some start-ups also have strong growth potential, with related economic benefits (OECD, 2021).

Nowadays Industrial companies are faced with challenges with the increasing complexity of their production processes. There is a good example of a complexity driver is the ever-increasing demand for products in the customized market and short life cycles and delivery times. Due to competitors companies make more products to remain more attractive in their market (Gottman, 2019).

Data Space technology will help supply chain analytics to describe the use of new data sources and analytical techniques to help companies design and run smarter, cheaper and more flexible supply processes. One of the most significant benefits is that with data space concept, companies could gain access to better data-driven predictions of obstacles in their supply chain to potentially avoid disruption scenarios altogether. Supply chain disruptions include natural disasters, labour shortages, cyberattacks, and global crises like COVID-19.

In order to increase new market potential opportunities there needs to be a change in mindset from classic bilateral data exchange to holistic, standardised and multilateral sharing of data from multiple stakeholders (value creation). Business related to the management of MDVC (multilateral data value chain) will increase by 60 in EU market (EU data strategy, 2020). The MDVC concept refers to the multilateral data sharing and can be explained within the CCM three-point fractal approach that is, (figure 5) the smallest possible unit for multilateral data sharing (Plattform industrie 4.0, 2022). The main idea is that any multilateral cooperation has a minimum of 3 components: factory, it provider and machine or process provider with the aim of generating economic added value for all parties involved.

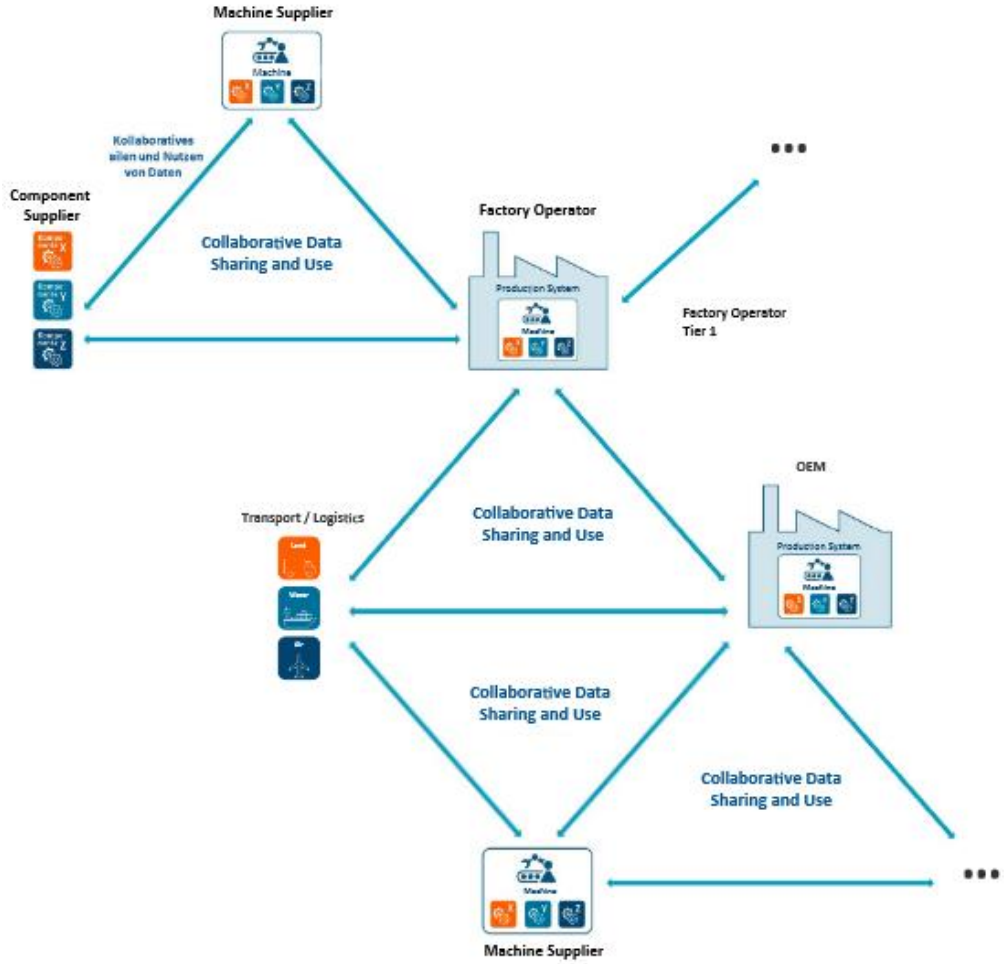
FIGURE 5: Multilateral data sharing reference model for industry 4.0.



All of these entities in the global value network of production have a variety of different bilateral relationships with their partners in the value chain. The complexity of these value networks can be modelled by scaling the three-point

fractal. So, the final idea consists in having a data space where all the MDVC could exchange data in order to create economic value (figure 6).

FIGURE 6: Cross-company collaboration in a production value network.



The data space and MDVC combination will let companies to access knowledge and innovation networks faster. Accessing knowledge networks is critical for SMEs to innovate and transform. Firms seldom innovate in isolation and networks of innovation involving multiple actors are the rule rather than the exception (DeBresson, 1996). Collaborative firms, even smaller ones, tend to be more innovative than non-collaborative ones, even larger firms (Eurostat, 2022). This is because innovation results from the accumulation of increasingly specialised knowledge and knowledge-based capital that calls for co-operating and opening innovation to gain efficiency and reduce time to market (Chesbrough, 2003). Indeed, networks are increasingly seen as an innovation asset (Corrado et al., 2005; OECD/Eurostat, 2018). The companies within the MDVC have the goal of commercialising data from the processes for creating goods and services and will define corresponding pricing models for this purpose. Another important data is that only 39% of European businesses share data with other businesses (Scaria, 2018). In table 1 it is possible to see the market segmentation by opportunity.

TABLE 1: Market segments by opportunity.

MARKET SEGMENT ANALYSIS	
TECHNOLOGY OPPORTUNITY	**INDUSTRY OPPORTUNITY**
▪ Cloud Computing ▪ Big Data and Analytics ▪ Cybersecurity ▪ Artificial Intelligence ▪ Internet of Things ▪ Others (Block chain & Business Intelligence)	▪ Banking ▪ Financial Services and Insurance (BFSI) ▪ Manufacturing ▪ IT and Telecommunications ▪ Retail and Consumer Goods ▪ Healthcare ▪ Education ▪ Transportation and Logistics ▪ Government ▪ Environment ▪ Others

In the upcoming years (2023–2025), open standards and interoperability will be the basis for new business models and a stronger focus on the customer experience. This includes the monetization of operational data as well as the co-development of products and their joint use.

5. DISCUSSION

This paper provides an introduction to a data space concept and multilateral data sharing concept, including its advantages and requirements. The article has analysed the European context of the data economy. It has also presented at a conceptual level the importance and significance of the data space technology and which are the sectors of socio-economic activity involved. We are talking about a new technology, therefore as any innovation process, it will need a period of testing and maturity based on the adoption by the companies. The article is intended as an introductory guide to the subject for entrepreneurs who want to get into the subject as well as for SME's that have some IT service that can join the technological wave of the European Data Spaces. It has been argued how the systematic collection and processing of usage data for multilateral data sharing therefore has significant economic potential.

6. CONCLUSION

Data Space is a key element of the digital future. These offer new business opportunities and strategic roles in a data-driven environment. Although its potential value is considered high and various use cases are working nowadays (BAIDATA; MANUFACTURING-X, DAWEX...), the underlying business model considerations are not widely communicated. For example, there is a lack of literature and must be a s future research step to consider resilience in the lifecycle of a value chain as an output of Data Space applications.

The paper provided an original conceptual assessment on the actual role played by space-based data at EU digital transformation scale for new businesses, but further studies are recommended to examine how to monetize Data Space environments.

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