

The Role of Human Capital in Shaping Ireland's Digital Economy

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Abstract

Despite researchers and policymakers recognising SMEs' significant role in the European economy, balancing success and failure is challenging due to the mismatch between adequate financial support and skilled human resources. The importance of SMEs for the European economy is determined by population, employment capacity, and contribution to economic growth. However, small companies face significant challenges as they compete with corporations seeking investment opportunities and direct access to finance. At the same time, the combination of these factors generates financial pressures on companies. On the other hand, developing specific managerial competencies becomes a solution for young SMEs as these practices help run the company effectively and avoid potentially high levels of failure associated with this sector. Considering that traditional training was significantly impacted during the COVID-19 pandemic, leading to an accelerated shift towards online and digital resources, the reviewed literature identified a lack of research examining the impact of online learning on management team development in SMEs to achieve performance improvements, social stability, and economic resilience. This paper addresses the research gap by integrating a case study examining the Irish technological sector and how entrepreneurs can develop management teams through online learning. The research findings reveal the requirement to embed learning theories in online learning to equip entrepreneurs with critical managerial skills for company growth.

Keywords: Management development, entrepreneurs, technological sector, online learning

Track Entrepreneurship Education

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Introduction

Europe's economic progress and development have fallen behind America, and the gap between the two economic powers keeps growing (OECD, 2022; European Commission, 2022). European countries depend significantly on the US for technology, energy, capital, and military protection. The 2008 Global Economic and Financial Crisis (GEFC) can be identified as the breakpoint, as the US and European economic divergence was initiated, and it has been accentuated over the past decade, with European economic performance falling behind sector by sector, determined by the technologies' expansion and geopolitical context (Beck et al., 2018; Chen & Lee, 2023; Seidl & Schmitz, 2024). The US and Chinese technological sectors have a dominant presence in European countries. Thus, the European Commission aims to address economic and political challenges and reduce technological dependency on the US and China by developing and implementing Open Strategic Autonomy for all European countries. To achieve technological independence, fair competitiveness, and zero-emission goals, the European Commission plans to invest heavily in strategic and critical economic sectors, including climate initiatives and education, specifically green, digital, and technological skills (European Commission, 2016; Hall et al., 2015; European Commission, 2023).

European companies recognise heavy dependencies on the US and China technological giants, who pioneer technological and innovative spheres (Sima et al., 2020; Vrontis et al., 2022; Pereira et al., 2023), which leads to serious competition for qualified staff attraction by offering competitive salaries, reward packages and development opportunities. Human talent is an essential part of any company, which forms the competitive advantage and determines the effectiveness of firm performance (Shela et al., 2023). At the same time, despite employees helping the company reach the goals of productive performance by applying their knowledge, skills and competencies, the level of automatisisation keeps growing, putting pressure on entrepreneurs in their attempt to find a balance between technologies and human labour (Korinek and Stiglitz, 2021; Vrontis et al., 2022). Therefore, support for innovation and technological growth cannot be underestimated in a global environment that is defined by increasing levels of competition, which is critical for Ireland due to its small, open economic model (Eurostat, 2020; Brownlow, 2020; Barry et al., 2019). Stable development of knowledge-intensive economic sectors, such as the technological sector, requires centres of creativity, collaboration, cutting-edge technology and highly skilled workers (Pereira et al., 2023). Seeking to address the demands of the evolving economic and industrial systems, so-called technological hubs have emerged around the globe, where, due to access to capital and government support, the US and China maintain leadership positions (World Bank, 2024; Seidl & Schmitz, 2024). Europe, in turn, keeps advancing the idea of technological "sovereignty" by investing in the sector spread between main players such as Ireland, the UK, and Germany (European Commission, 2024).

Ireland has an outstanding position in the European technological sector, known as the Silicon Valley of Europe. Being an English-speaking country with representation of major technological giants' in its European headquarters, Ireland can attract the necessary human capital (Hervas-Oliver et al., 2021). The importance of SMEs as the backbone of the European industry model poses significant challenges. They can find themselves in a disadvantageous position compared to corporations, experiencing difficulties with employees' attraction and offering them competitive salaries and compensation packages (O'Donnell, 2014; Leick and Gretzinger, 2020; Durst et al., 2023). Besides, industrial development brought numerous opportunities and concerns about the future of the workforce and future skill needs despite the human-centred approach and focus on people and soft skills. Following this trend requires

entrepreneurs to prioritise investments in upskilling and reskilling their staff (Jang, 2016; Smith and White, 2020) with emphasis on lifelong learning, teamwork, decision-making ability, and collaboration (Teng et al., 2019; Weritz, 2022; Morandini et al., 2023). However, as human capital development investments represent a long-term perspective, they create constraints for business owners, as any investment seeks adequate strategy in balancing operational activity and developmental needs (Oghenekohwo et al., 2017; Bekele et al., 2024).

Aiming to become a world-leading location for start-ups and develop future global management teams, Ireland needs to consider the needs and reshaping of the labour market and the significance of developing workers' skills to interact in a global context as required by its open economic model. Irish economic model represents significant dominance of the sectors driven by foreign direct investments (FDI) directed by American tech giants started in the 1990s, heavily prevailing in technological (2.5%), pharmaceutical (0.03%) and services (61%) sectors (Birdthistle, 2019, van Aarle et al., 2015, O'Rourke & Ó Gráda, 2021; Government of Ireland, 2022; FAME, 2025). FDIs, while offering host countries various developmental possibilities, at the same time, put them in a vulnerable position to global dynamics and rising levels of uncertainty. The government should offer an appropriate policy framework to support SMEs to consolidate their operations and avoid potentially high levels of failure associated with this sector (Smith et al., 2022; Torkkeli & Durst, 2022; OECD, 2022). Therefore, this study explores the following question: "Can online learning contribute to human development through management practices in SMEs?" The research framework is based on an Irish technological sector case study through the semi-structured interviews framework, undertaken with seven start-ups and five small company owners, supported by eight experts from corporations, digital educators and policymakers. The aim is to shed light on the link between online learning and what required skills entrepreneurs can develop to manage people successfully in start-ups and build essential global links for businesses (McAdam et al., 2007; Grandinetti, 2016; Asher and Popper, 2019; Bratianu et al., 2020; Matić, 2022).

Entrepreneurial mindset and expertise

Start-ups, being newly registered young companies in the process of their business model exploration and transforming their idea into a consolidated business for further successful operation, can be unstable during their development; therefore, achieving specific managerial skills becomes a solution for young SMEs to run the company effectively and avoid potentially high levels of failure associated with this sector (OECD, 2022; Smith et al., 2022; Torkkeli & Durst, 2022; OECD, 2022). The smooth transition from start-up to growth company requires the owner to receive management experience, expand managerial skills, build an effective team, and move from short-term planning to strategy. Entrepreneurs' management development can be seen as expanding their expertise and equipping them with the required teamwork skills, team learning, and networking. In an attempt to find a balance between technologies and human labour, more concerns are rising regarding how to embed the social component into people interaction, which puts pressure on entrepreneurs (Liu et al., 2022; Grierson and Munro, 2018; Faizuniah & Chan, 2014; Parke & Campbell, 2014; Berry, 2011). System and critical thinking, self-awareness, problem-solving, and leadership represent the basis of individual entrepreneurial skill sets developed as a part of the entrepreneurial mindset of future business leaders (Ernst and Young, 2023; PwC, 2023). Management development involves developing executives' cognitive abilities, aiming to change their behaviour afterwards, aligning online learning with experience-based and digital learning approaches that

lead to successful company growth, and building and growing the management team presented as illustrated in Table 1 below (Kuratko, 2005; Kuratko and Morris, 2018).

Table 1. Concept Framework: from individual mindset to management team development.

Author	Journal [Citations]	Concepts	Contribution to methodology	Learning theory/Gap
INDIVIDUAL level - Entrepreneurial mindset, expertise				
Daspit, Fox, & Findley et al., (2023); Kuratko, Fisher, & Audretsch et al. (2021); Haynie, Shepherd, Mosakowski, & Earley et al. (2010); Kuratko, Hornsby & Bishop et al. (2005)	<i>Journal of Small Business Management</i> [188] <i>Small Business Economics</i> [387] <i>Journal of Business Venturing</i> [954] <i>International Entrepreneurship Management Journal</i> [311]	The main features of EM are value creation , the ability to recognise and act on opportunities, adaptability and resilience , cognitive perspective , decision-making with limited information , and uncertain and complex conditions. Innovations and technologies are central to entrepreneurship. EM focuses on knowledge , experience , problem-solving, seeking opportunities, and beliefs .	Systematic literature review; Literature review; Integrating literature streams from social and cognitive psychology toward an entrepreneurial metacognition model. Survey for the 670 managers sample.	Entrepreneurial and management mindsets differ. As EM includes thinking, skills, and motivation, elements of behaviourism - a change set of skills and competencies, cognitivism as knowledge construction and humanism could be implemented in entrepreneurial education.
Handayati & Narmaditya et al., (2020); Mawson, Casulli, & Simmons et al., (2023); Cui, & Bell et al., (2022)	<i>Heliyon</i> [254]; <i>Entrepreneurship Education and Pedagogy</i> [27] <i>International Journal of Management Education</i> [198]	Effective entrepreneurs can use the means they already have to generate new means to deal with high levels of uncertainty. Feedback from the environment is highly important for future actions and plans. Insights in thinking and behaviour and cognitive adaptability equal to flexibility .	Survey for the 450 students sample. Literature review and conceptual framework. Survey for the 2250 students sample.	EM influences individual and venture levels, except considering changes in behaviour, and knowledge should be implemented in meaning-making constructions and networking.
Management development for entrepreneurs				
Moshman et al., (1982); Pittaway & Cope, (2007b); Rae et al., (2009); Lack��s et al., (2016); Neck & Corbett, (2018)	<i>Developmental Review</i> [516] <i>Entrepreneurship and Regional Development</i> [2625] <i>Entrepreneurship Education and Pedagogy</i> [1305]	The experiential learning theory is mostly applicable in entrepreneurial education. Despite its effectiveness in elaborating on entrepreneurial programs and practical skills , it misses human interaction's cognitive, behavioural, and emotional aspects.	Literature review; Systematic literature review; Policy research; Delphi Panel approach, with 17 expert entrepreneurship educators.	Experiential learning theory - in-depth understanding of the learning process, the focus of learning, and outline educational strategies
Pavlov, (1938); Skinner, (1958); Gagne, (1985); Thorndike, (1999); Baldwin, (2011); Jordan, (2008); Allen et al., (2022)	HBJ College; <i>Academy of Management Learning & Education</i> [128]; New York: Routledge; <i>Journal of Management Education</i> [101]	The role of the behaviourist theory involves positive reinforcement of the entrepreneur's behaviour in discussing the nature of the problems, looking for possible solutions, and testing the outcomes of actions by facilitating critical and analytical feedback .	Survey for the 2644 students and 21319 managers sample. Literature review and application by integration.	Behaviourism helps to address the specific aim of behaviour change in the EE curriculum.
Knowles, (1988); Rogers, (1969); Maslow, (1971); DeCarvalho, (1991); Bass, (2008); Johnson, (2014); Bates, (2015); Tjosvold et al., (2006).	SAGE Publications Ltd London: Constable; <i>Annals of Psychologist; Theory</i> [687], <i>Research and Practice Journal</i> [117]	Humanism, focused on personal growth and the full development of individual potential , contributes to EE by developing intellectual, emotional, creative, and physical skills and monitoring the learner's progress, forming a foundation of an entrepreneur's lifelong learning approach.	Comprehensive literature review. Survey for 64 managers and 26 employees.	Humanism helps address the specific aim of emotional change in the entrepreneurial education curriculum.
Dewey, (1938); Piaget, (1970); Bruner, (1971); Vygotsky, (1978); Gagne, (1992); Winn, (1990); Ertmer et al., (2013)	Columbia University Press; Harvard University Press; <i>Instructional Science</i> [319]; <i>Performance Improvement Quarterly</i> [1978]	Integration of this concept in the EE became essential due to the understanding that new knowledge is based upon prior experience and helps improve critical thinking , problem framing, and problem-solving strategies.	Examining some of the implications of recent developments in cognitive theory for instructional design. Literature overview.	Cognitivism helps to address the specific aim of cognitive change in the entrepreneurial education curriculum.
Bandura, (1986); Kop & Hill et al., (2008); Siemens, (2005); Dunaway, (2011); Brieger et al., (2020)	<i>International Review of Research in Open and Distance Learning</i> [1615]; <i>Eleanspace</i> [155]; <i>Reference Services Review</i> [355]; <i>European Journal of Training and Development</i> [108]	Constructivism considers previous participants' experiences flexible in learning approaches with deep engagement in the educational process , developing social and communication skills , and owning what has been learned. Constructing knowledge leads to entrepreneurs' development of problem-solving, collaboration, networking, and self-awareness skills.	Critical analysis and theory positioning. Structured literature review. Identifying trends in learning theories. Theory exploration and conceptualisation of the main principles.	Connectivism helps to address the specific aim of network building in the entrepreneurial education curriculum.

Dewey, (1938); Piaget, (1957, 1970); Kolb, (1984); Gopnik & Wellman, (2012); Mvududu et al., (2005); Chuang et al., (2021); Archambault et al., (2022)	<i>Psychological Bulletin</i> [987]; <i>An International Journal for Statistics and Data Science Teaching</i> [79]; <i>Performance Improvement</i> [335]; <i>Educational Psychologist</i> [263]	Connectivism theory addresses the interaction where people can exchange knowledge, information, skills, and experiences and learn from each other. The principle of connectedness supports taking different roles that contribute to developing critical competencies and moving from an individual level of skills and competencies to an enterprise level.	“Theory” is grounded in the computational framework of probabilistic causal models. Literature review and knowledge contextualisation.	Constructivism helps to address the specific aim of the meaning construction in the entrepreneurial education curriculum.
VENTURE level - Company growth				
McAdam, & Reid et al., (2001); Roffe et al., (2007); Decuyper, Dochy, & Van den Bossche et al., (2010); McKeown et al., (2012); Massaro, Handley, Bagnoli, & Dumay et al., (2016); Durst, Edvardsson, & Foli et al., (2023)	<i>Journal of Knowledge Management</i> [647]; <i>Journal of European Industrial Training</i> [40]; <i>Industry and Higher Education Journal</i> [810]; <i>Educational Research Review</i> [317]; <i>Journal of Knowledge Management</i> [56]	Learning in teams: - entrepreneurs are perceived as self-made individuals without formal degrees, - in the context of "a knowledge-intensive " economy and technological sector, team learning is essential for innovation, effectiveness and reducing the risk of failure, - learning in teams is essential for SMEs , as only a few people own the relevant knowledge and information required for successful performance .	296 research questionnaires and participants workshop afterwards. Analysis of 9 case studies. 18 qualitative in-depth interviews. Integrative and interdisciplinary literature review. Structured and follow-up literature review.	Complexity of team learning achievement. Difficulties in sharing knowledge from individual to the group. Time and finance constraints in group learning organising.
Morrison et al., (2006); Cheng, Wang & Spector et al., (2014); Nambisan & Wright et al., (2017); Mishra, Sahoo, & Pandey et al., (2021); Troise, Corvello, Ghobadian & O'Regan et al., (2022); Kearney & Lichtenstein et al., (2023)	<i>Synergy</i> [234]; <i>Educational Research Review</i> [226]; <i>Strategic Entrepreneurship Journal</i> [102]; <i>Distance Education; Technological Forecasting and Social Change</i> [494]; <i>British Journal of Management</i> [17]	Online learning: - effective for SMEs if it is correctly targeted and based on specific goals, - offers various opportunities for training, development, and leadership, - provides specific learning quickly instead of going through the traditional long-term programmes,	Bibliometric and scientometric analysis and normative framework. The research was conducted with an online survey of 204 innovative SMEs. Interviews with 20 start-up CEOs.	Despite digital learning areas of implementation, including continuing education, professional development, and knowledge management in the workplace, there is a lack of research on the relationship between management development and online learning.

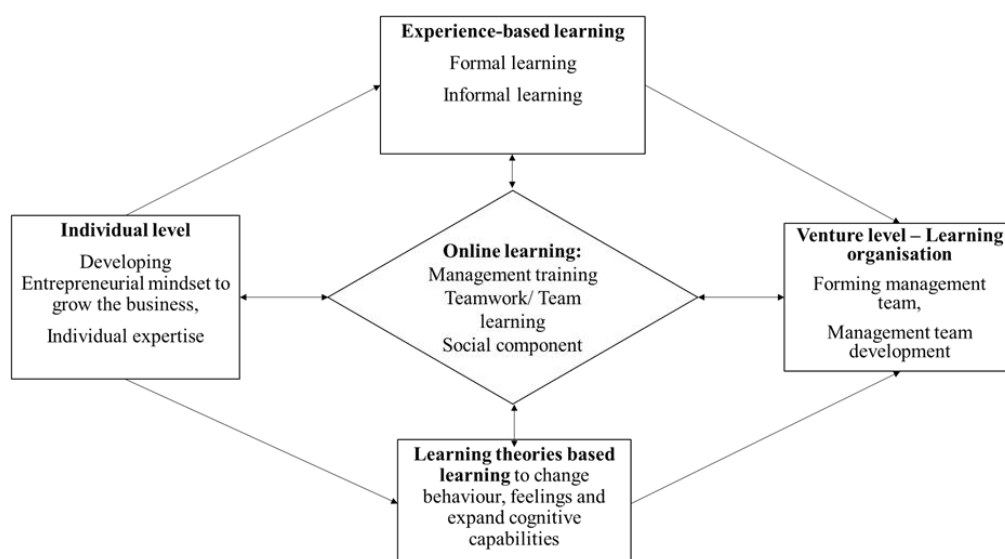
Source: Authors elaboration (2025).

Considering the individual entrepreneur expertise, which includes thinking, constructing meanings, and behaving (Kuratko, 2005; Kuratko and Morris, 2018), can be developed with the help of learning theories through experience-based, formal and informal learning with the help of team learning and teamwork in the online environment will lead to the development of founders' management capabilities through forming management teams and their further development. Combining these approaches will expand learning experiences by embedding real-life experiences into effective learning organisations, an essential component of stable small company development and growth. Enhancing entrepreneurs' management capabilities will help them successfully pass the vulnerable start-up stage and perform within the highly competitive market. However, direct access to finance remained an obstacle to small businesses due to a possible lack of credit history, insufficient savings, and constraints in reaching direct funding through the bank system (McGeever et al., 2022; OECD, 2019).

Learning theories for management team development in SMEs

Training and development in small and medium-sized companies remains a relatively new field of science (Lazarević & Lukić, 2018; Owalla et al., 2022). However, in working environments subject to continuous and evolving economic uncertainties and political challenges, acquiring valuable information and converting it into a knowledge management strategy becomes a priority. The question is how busy entrepreneurs can engage with vast volumes of information so that the industry can extract all necessary economic and political information if their background relies or it is mainly limited to knowledge received in school, college, and experience and the global economic landscape is defined by its high levels of uncertainty and fast pace of change (St-Pierre et al., 2023). Here, the team plays a crucial role

as a critical information holder and a source of invaluable insights (Santos et al., 2012; Ng and Kee, 2018; Tam & Gray, 2021). Learning theories can help develop, design and implement effective learning environments that foster participants' understanding and ability to collaborate, co-create and share knowledge (Kuratko and Morris, 2018; Gorman et al., 1997). For management team development, implementation of specific learning theories, such as behaviourism, cognitivism, humanism, constructivism, and connectivism, is essential, as they provide an in-depth understanding of the learning process, helping to define and understand the focus of learning and outline educational strategies (Hägg and Gabrielsson, 2020; O'Connor et al., 2021). Management team development as the expansion of individual entrepreneur skills development and teamwork within the online framework concerning the social component, as presented in Figure 1 (Faizuniah & Chan, 2014; Parke & Campbell, 2014; Berry, 2011), will lead to developing management competencies to support a smooth transition from newly created ventures to developing companies (Liu et al., 2022; Grierson and Munro, 2018). System and critical thinking, self-awareness, problem-solving, and leadership represent individual entrepreneurial skill sets developed as a part of the entrepreneurial mindset of future business leaders (Ernst and Young, 2023; PwC, 2023). Management development involves developing executives' cognitive abilities to change their behaviour and align online learning with learning approaches to successful company growth, building and growing management teams (Kuratko, 2005; Kuratko and Morris, 2018).



[insert Figure 1.] Figure 1. Online Learning Framework: from individual mindset to management team development. Source: Authors elaboration (2024).

Moreover, learning theories support knowledge circularity, representing a changing and evolving process of knowledge that is built on the construction, co-design, participation and sharing of dynamic and proactive processes and becomes a basis for critical entrepreneurial skills development (Nazim et al., 2024; Abdigapbarova and Zhiyenbayeva, 2023; Kerimbayev et al., 2023; Morales et al., 2022). They move towards understanding what needs to be done for management team development and help to receive and build knowledge for system thinking and problem-solving competencies development, change behaviour to become more effective (Kuratko and Morris, 2018; Gorman et al., 1997; Solomon et al., 1994).

Online learning impact on management team development in SMEs

Considering the effects of COVID-19 and the fact that most businesses across entire sectors were completely closed for a significant period, online learning can mitigate these

negative effects by offering various opportunities for training, development, and leadership (Mishra et al., 2021). SMEs should consider carefully integrating digital technologies into their operations and fastening the online learning implementation process to close existing skill gaps. The employees' demand has shown the necessity of changes in getting specific learning quickly instead of going through the traditional long-term programmes (Nachmias & Hubschmid-Vierheilig, 2021). Online learning might be very effective for SMEs if it is correctly targeted and based on specific goals (Nachmias & Hubschmid-Vierheilig, 2021).

Looking into general trends in online learning research, the following directions can be identified: online learning for continuing education, professional development, specified health and safety education, social media for informal learning, and knowledge management in the workplace (Cheng et al., 2014; Mishra et al., 2021). In online learning research, computer and educational studies retain dominant positions as main subjects for publications (Amoozegar et al., 2018; Fatima & Abu, 2019; Moreno-Guerrero et al., 2020) and educational purposes mostly covered Higher Educational Institutions (Bond, 2020; Mishra et al., 2021). However, looking at businesses, technological literacy plays a crucial role as digitalisation has become a new reality, helping to provide significant changes in organisational structures and decision-making processes (Penco et al., 2022). Thus, professional training actively moves online, helping entrepreneurs survive, improving their business processes for effective growth, and, as a result, creating new employment capacity that benefits the economy, although quite little is known about the relationship between management development and online learning itself (Moreno-Guerrero et al., 2020; Mishra et al., 2021; Penco et al., 2022).

The reviewed literature demonstrates the requirement for entrepreneurs to build a strong skill set of managerial and digital competencies to drive their own companies successfully (Nazim et al., 2024; Abdigapbarova and Zhiyenbayeva, 2023; Kerimbayev et al., 2023). However, financial constraints prevent business owners from proper strategic planning, including designing clear training plans (McGeever et al., 2022; OECD, 2019). Amidst economic sectors, technology stands at the forefront of innovation and requires "knowledgeable" staff due to its complexity and high implementation costs. Methodological choices for research in the space of entrepreneurial development, reflected in Table 1, mostly included mapping the body of research studies through literature reviews and quantitative approaches, like surveys and sectoral reports. Therefore, for this research paper, the analysis of the Irish technological sector is supported by semi-structured interviews of industry representatives in combination with purposive sampling. For a qualitative study, purposive selection allows insights from a relatively small sample to be received while deepening the depth of understanding (Miles and Huberman, 1994; Palinkas et al., 2015). Purposive sampling strategies move away from any random sampling and seek specific kinds of people who may shed light on the researched question (Trost, 1986; Mason, 2002; Robinson, 2014). This approach will benefit entrepreneurs themselves, educational leaders and policymakers.

Methodological Framework – Qualitative Approach

Small and medium-sized companies significantly influence global and regional economies, providing a positive business climate and strengthening economic competitiveness (Roszko-Wójtowicz & Grzelak, 2020; Guerrero & Espinoza-Benavides, 2021). The technological sector has paramount priority for the European Union, as SMEs help ease the dependence on foreign companies represented by the US and Chinese technological giants (Sima et al., 2020; Vrontis et al., 2022; Pereira et al., 2023). Investing in SME development alleviates heavy dependencies from corporations as these measures reduce the pressure of their possible exit from the domestic market, redirecting their markets and supply chains and giving

more freedom in using economic resources (Raeskyesa, 2020; Rokhmawati et al., 2021; Bohle & Regan, 2021).

SME representation in Ireland reaches 99.5% of all Irish businesses and creates two-thirds of all employment capacity (CSO, 2022; European Commission, 2022; FAME, 2025). The database FAME was chosen as an initial source of business information about Irish and UK companies, as an industry research and stock database, driven by Moody's (2025). A careful analysis of the industry classification parameters highlighted how the businesses' structure is closely linked to their economic sector, and according to FAME, the overall number of active companies operating in Ireland in 2025 reached 295,661, wherein 7,449 companies equal to 2.5% represents the technological sector. The technological sector shows a constant upward trend in absolute numbers, reaching 17% growth in new ventures for the last 5 years and 63% over the previous 10 years. The results demonstrate a noticeable decrease in start-up launches while the number of SMEs and multinationals is growing. This trend supports the growing necessity of the Irish economy diversification to ease dependency on direct onward investments from the United States, which entered a period of turbulent changes (Rokhmawati et al., 2021; Bohle & Regan, 2021). Looking at companies' sizes, 96% of all Irish technological companies represent SMEs and generate 2% of the turnover. In comparison, non-SMEs occupy 4% of absolute numbers and generate 98% of all turnover, as illustrated in Table 2 below. At the same time, the employment capacity of SMEs is close to 4% compared to 96% in corporations in the technological sector. Therefore, the Irish technological sector has demonstrated stable growth in new venture launches, turnover, and employment creation since 2015.

Table 2. Evolution of the Irish Technological Sector 2015 – 2025

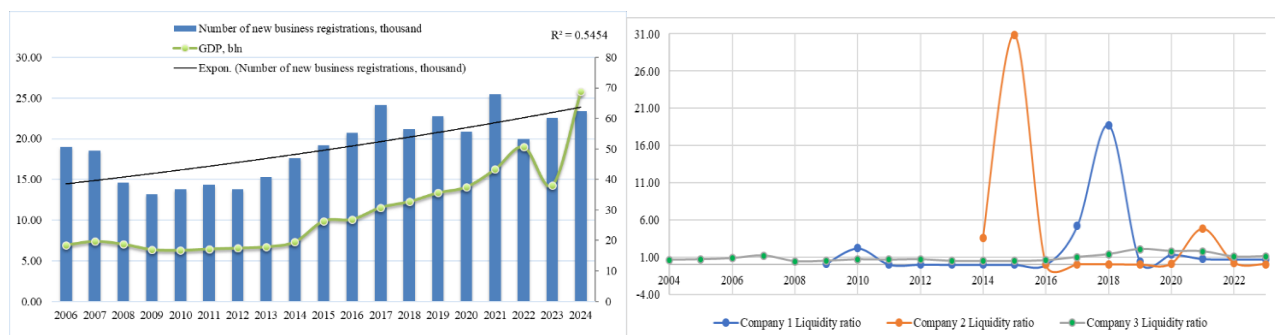
Irish technological sector	Performance in 2024	Performance change 2020-2024	Performance change 2015- 2024
Companies numbers	7449	17%	63%
Start-ups	1107	-0.366	-0.197
SMEs	7176	0.169	0.622
MNCs	273	0.092	0.796
Financial indicators (Turnover, mln)	309.88	3%	34%
Start-ups	28.68	0.205	1.177
SMEs	5.74	0.143	0.641
MNCs	304.14	0.024	0.338
Employment impacts (thousands)	1112.39	2%	34%
Start-ups	137.24	0.075	7.324
SMEs	46.91	0.100	0.476
MNCs	1065.48	0.015	0.331

Source: FAME, adapted by the authors (2025)

According to FAME (2025), 1,107 companies were identified as start-ups, equal to 15%, with 9% of turnover and 12% of all employment capacity. Although turnover and employment indicators have grown in the previous 10 years, start-ups demonstrate an overall downward trend in new openings despite the intensive technological advancements and

economic demand (Rokhmawati et al., 2021; Bohle & Regan, 2021). Start-ups occupy quite a vulnerable position, as this stage has the highest failure rate, and sustainable growth becomes crucial for entrepreneurs (Garnsey et al., 2006; Reid & Sanders, 2005). However, to provide growth, start-ups could secure access to finance to determine their management approaches and learning strategies to operate successfully (McGeever et al., 2022; OECD, 2022).

Figure 2. Start-ups and GDP in Ireland and SMEs liquidity ratios.



Source: Authors elaboration, adapted from CRO (2024), FAME (2025).

The research findings show a consistent upward trend of opening new ventures, as represented in Figure 2, that started in 2014 (CRO, 2024; FAME, 2025). Despite disruptions in 2022 caused by the lagging effects of the 2020 Global Health Crisis due to prolonged restrictions, social distancing measures and economic hibernation that contributed to financial distress and revenue shortfall (Azadnia et al., 2022; Kren et al., 2021a), the growing number of newly registered businesses in 2023 reveals the recovery trend for SMEs. Moreover, gross domestic product (GDP) has grown similarly since 2014, showing the importance of new venture creation for economic growth (World Bank, 2024). At the same time, private companies' unwillingness to disclose necessary data constrained access to SMEs' financial results, offering a better understanding of the sector's financial limitations and constraints. As a result, only three companies' liquidity ratios, as a composition of current assets and liabilities, were in the public domain, highlighting a similar fluctuating trend between 0 and 1, except for periods when investments were attracted (Chambers & Lacey, 2011; Kontuš & Mihanović, 2019). Experiencing significant constraints with finance attraction, small businesses struggle with managerial and digital skills development, limiting their growth capacity (Finnegan & Kapoor, 2023; Liu et al., 2024).

Research design and data collection

The qualitative approach was chosen for this study, aiming to capture entrepreneurs' views and opinions on strengthening their managerial skills and expertise (Creswell, 2005; Creswell, 2007). Considering the importance of the technological sector and the knowledge intensity involved, it was chosen as a case to understand practical problems faced by start-ups to provide insights for practitioners, researchers, and policymakers (Bassey, 1999; Hamilton & Corbett-Whittier, 2013; Yin, 2018). Purposive sampling has become a research strategy which targets business owners of technological start-ups and small companies, employees in tech giants, and representatives of digital educators and governmental bodies. Purposive sampling included the following criteria: 1) distinguishing companies for start-ups (less than 5 years in operation), older than 5 years were determined as established; 2) educational companies-providers of digital programs; 3) policymakers, involved in providing digital training support; 4) corporations, that actively incorporate digital skills (Grégoire, Barr and Shepherd, 2009;

Miles and Huberman, 1994; Palinkas et al., 2015; Campbell et al., 2020).

Considering the previous studies in entrepreneurship, which used a qualitative approach, semi-structured interviews with founders/CEOs were used as a primary data collection tool (Eisenhardt, 1989; Gephart, 2013; Kearney & Lichtenstein, 2023). Interviews were chosen for their flexibility, ability to gather rich, empirical data and the possibility to adjust questions according to participants' responses (Ruben, 2005; Polit & Beck, 2010; Eisenhardt & Graebner, 2007; Welch et al., 2011; Kallio et al., 2016; Adeoye-Olatunde & Olenik, 2021). Interview questions were guided by previous topic research, and all participants were asked the same questions to provide consistency (Taylor, 2005; Parahoo, 2006; LoBiondo, 2010; Green, 2014; Varpio et al., 2019; Holloway & Wheeler, 2010; Kallio et al., 2016). The interview phase was held from October 2023 to December 2024 and lasted from 40 to 60 minutes.

Figure 3. Research methodological framework.

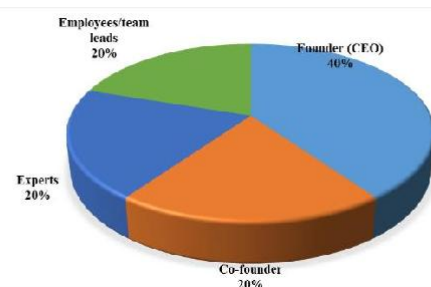


Source: Authors elaboration (2025)

Triangulation was utilised to strengthen the reliability, validity and trustworthiness of qualitative data (Lincoln and Guba, 1985) to compare findings from empirical data with the theoretical framework and insights from sectoral reports and website information (Tippmann et al., 2013; Lincoln & Guba, 1985). The overall methodological framework is presented in Figure 3. NVivo software management system was chosen for the data storage and analysis processes, as this software is designed for in-depth exploration and understanding of qualitative data, broadly used in the field of business and management studies (Sotiriadou et al., 2014; Limna, 2023; Allsop et al., 2022; Dhakal, 2022; Limna, 2023).

Figure 4. Research sample representatives and participants' roles in companies.

Company size	Number
Start-ups	7
Established	5
MNC's employees	4
IBEC Academy, IUA, Dublin City Council, Fora	4
Total	20



Source: Authors elaboration (2025)

The purposive sample resulted in 20 interviews covering all sampled criteria and being in alignment with the common practices, giving insights into managerial development through digital learning from multiple perspectives. The sample included seven start-ups and five established small companies (Figure 4), where 40% and 20% of respondents were founders and co-founders, 20% - were employees and team leaders from multinational companies, and 20% were experts from IBEC Academy, Irish University Association, Dublin City Council and

Regional Skills Fora. Geographically, participants represented the following major Irish cities: Dublin technological hub (80%), Cork (15%), and Galway (5%). Dublin concentrates on main multinational subsidiaries of technological giants in line with start-ups, additionally providing supplemental services to various companies in their region and beyond (Miörner et al., 2019; Sarraipa et al., 2023).

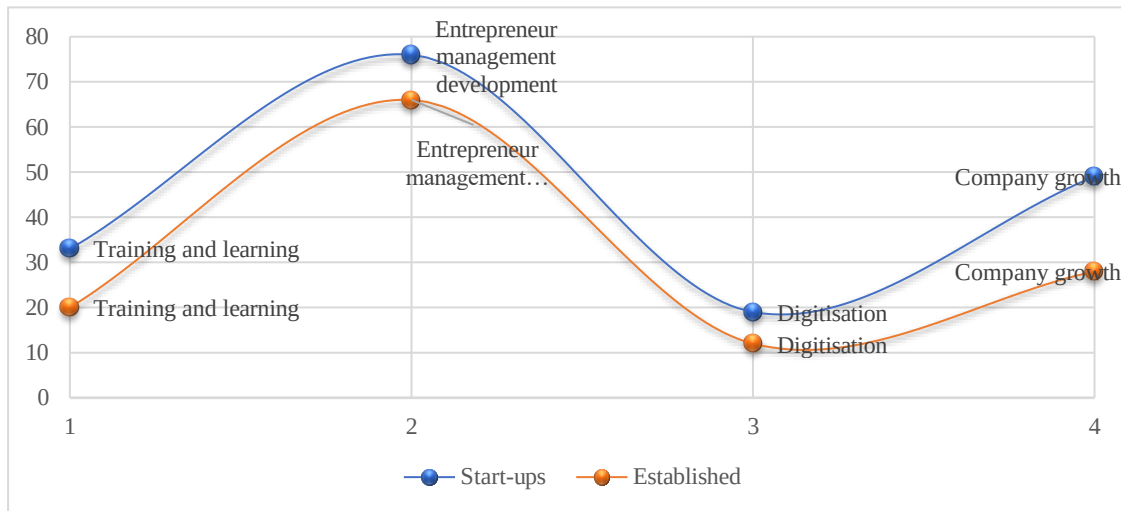
Data analysis

In order to start data analysis from individual entrepreneurs' understanding of management development and possibilities of online learning, broad definitions as a part of the coding methodology and to establish the research significance of each interview transcript were applied (Strauss and Corbin, 1998; Kearney & Lichtenstein, 2023). In the first step, coding included breaking each interviewee's data into particular parts with a focus on the content and inductive qualitative techniques were used in developing 'in vivo' codes (similar to open coding) to analyse and reflect the respondents' language as it generates a very detailed representation of the data (Strauss & Corbin, 1998; Tippmann et al., 2013). Analysis of every interview involved comparing received codes for similarities and differences to include new information into an existing code or create a new one. As understanding of the data developed, similar, thematically under broader codes were defined, which were then summarised, clearly labelled, and defined to avoid ambiguity (Denzin and Lincoln, 2011; Saldana, 2013). The final step has become clustering these themes under higher-level categories, guided by the theoretical framework and emerging themes from the data, to integrate and conceptualise the data (Miles & Huberman, 1994; Strauss & Corbin, 2008; Tippmann et al., 2013). The analysis focused on the data structures to support theory building and data analysis (Gioia et al., 2013).

Findings

The empirical analysis followed the framework presented in Figure 1 and identified core categories of company growth, entrepreneur management development, digitisation, training, and learning concepts. Start-ups were considered as companies operating for less than or equal to five-year periods (Smith et al., 2022; Torkkeli & Durst, 2022); however, the main criteria for being or not being a start-up became the owners' perception of the company's current stage. This distinguishing is crucial for start-ups due to their extremely high failure risk (Srinivasan et al., 2014). Comparing the core categories for start-ups and established companies, according to their appearance in the answers, entrepreneurs' management development has been prioritised by all companies with less emphasis on training and learning, company growth, and digitisation as illustrated in Figure 4 below.

Figure 4. Comparison of concepts importance for start-ups and SMEs.



Source: Author's elaboration (2024)

Entrepreneurs' background as a key to success

The research findings reveal a significant recognition of the management team as the most influential member in decision-making and the operational aspects of running businesses. Despite management teams being mostly common for large corporations, small firms start to form management teams after they pass the start-up stage; therefore, in most start-ups, founders represent the management team. Despite the general idea that entrepreneurs have no formal degree when starting their business (Santos et al., 2012; Ng and Kee, 2018; Tam & Gray, 2021), the technological sector differs significantly. All entrepreneurs in the study have university degrees: 80% have postgraduate level and 20% - undergraduate. Moreover, looking at the postgraduate level of education, 90% of participants obtained postgraduate diplomas and master's degrees, while 10% had doctorates.

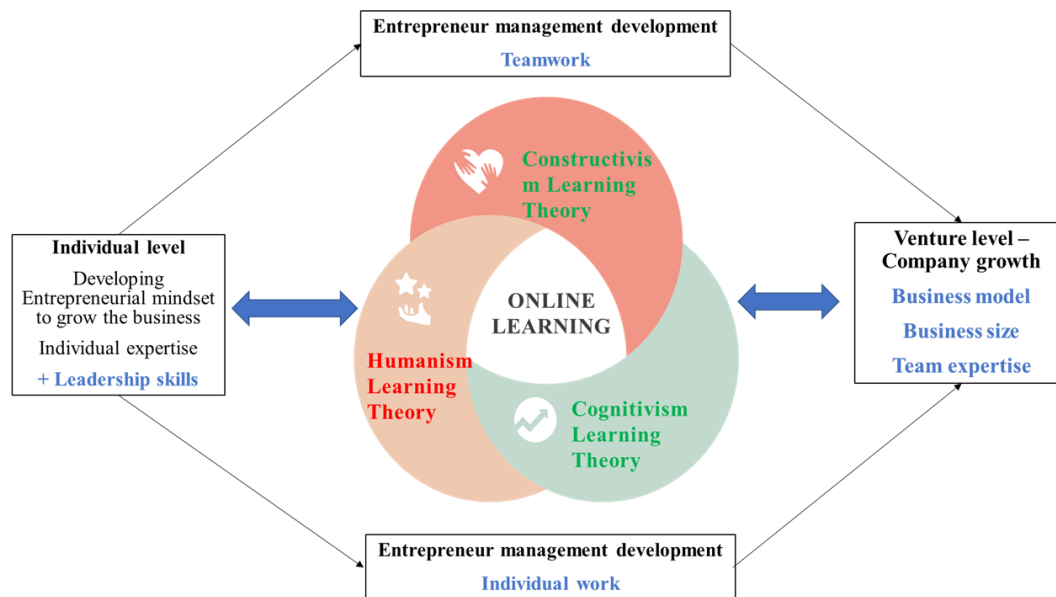
Management development can be reached when entrepreneurs expand their mindset based on individual expertise and leadership skills, using various options of online learning in team formation, team training and teamwork and moving beyond the individual to venture level and team expertise (Durst and Edvardsson, 2012; Massaro et al., 2016). Analysing previous participants' experiences, 10 of 12 SME owners demonstrated robust experience in management roles in companies of different sizes, including corporations. This experience gives a competitive advantage to companies, specifically start-ups, moving to a more mature stage and making business models more effective (Asher and Popper, 2019; Bratianu et al., 2020; Matic, 2022).

Two sides in training investments in small companies

Business owners face a significant demand for the required knowledge, expertise, and skills to navigate the company to success, specifically people management skills to retain their core staff more effectively and mitigate the risk of company failure (Teng et al., 2019; Weritz, 2022; Morandini et al., 2023). The framework for acquiring people's performance skills includes a combination of teamwork and individual work in using online learning for building cognitive constructs and acquiring knowledge, referring to a cognitive learning theory, and constructing received meaning in alignment with a constructivism theory (Kuratko, 2005; Kuratko and Morris, 2018). However, all offered techniques and practical, experience-based learning are unable to address the human-centred approach lagging in Humanism theory application, as shown in Figure 5. Therefore, to achieve the company's growth and start management team forming, entrepreneurs will be required to expand their knowledge of hiring,

onboarding, and retaining processes, which form a management skill set (McAdam and Reid, 2001; Durst and Edvardsson, 2012; Massaro et al., 2016).

Figure 5. Online learning for management team development.



Source: Authors elaboration (2024)

Management development for the CEO represents professional training, knowledge of how to work with the team, and expanding own leadership skills, moving from individual to team expertise, and online learning became an essential instrument in achieving these goals. However, results show that executives recognise that only a few core people in the company own all essential knowledge, and they recognise the efforts to retain these people in the company; surprisingly, finance was not mentioned as a constraint or obstacle to company functioning (O'Donnell, 2014; Leick and Gretzinger, 2020). Reviewed literature emphasises the role of investments for a long-term company's perspective and potential constraints for business owners without adequate funding to balance their operational activity and developmental needs (Oghenekohwo et al., 2017; Bekele et al., 2024). Although companies' liquidity ratios fluctuate around zero and require significant funds for research due to the "knowledge intensity", CEOs do not bring this point to the discussion.

Entrepreneurs' management development for the company's growth

Data from interviews provided evidence that the main problem for successful training implementation remains a specific approach to understanding the training needs as management and the expectations of the managed people are evolving, as illustrated in Table 3. Online learning became a choice for its simplicity, cost-effectiveness, and flexibility in meeting business objectives. On the other hand, complexities in identifying the strengths of existing teams prevent entrepreneurs from wide usage, as they are cautious about its necessity and effectiveness (Tannenbaum et al., 2012; McNamara & Emn, 2020; Kearney & Lichtenstein, 2022). Although it can be difficult for managers to recognise if staff struggles in an online environment, entrepreneurs recognise the value of digital learning due to its ability to rapidly and effectively achieve various learning goals. Online learning offers a huge number of solutions for the entrepreneur's immediate requests, helping them to grow their general level

of knowledge without too much broadening it (Cheng et al., 2014; Mishra et al., 2021), despite its lack of physical interaction, which can affect the overall level of engagement and dynamic.

Building management experience and expanding managerial skills represent essential pillars for the smooth transition from start-up to growth company (Liu et al., 2022; Grierson and Munro, 2018; Kuratko and Morris, 2018). Entrepreneurs' management development heavily relies on developing their expertise in teamwork skills, compulsory team learning, and networking. Despite the strong emphasis stated by the literature, entrepreneurs do not provide any management training nor encourage their teams. The role of managers as a critical element in the company and a change driver in sustainable development mechanisms (Nazim et al., 2024; Abdigapbarova and Zhiyenbayeva, 2023; Kerimbayev et al., 2023) would also be challenged by the growing rise of Artificial Intelligence (AI).

Technological literacy plays a crucial role in successful companies' digitalisation and helps to support significant changes in organisational structures and decision-making processes (Fatima & Abu, 2019; Moreno-Guerrero et al., 2020; Penco et al., 2022). Empirical findings highlighted the role of digital learning in diversifying whole business approaches, missing in-person communicative components and broad interest in AI as a main information source. Entrepreneurs have to engage with vast volumes of information to survive within high levels of uncertainty in the industry and the fast pace of change globally (St-Pierre et al., 2023). Thus, the team is a critical information holder (Santos et al., 2012; Ng and Kee, 2018; Tam & Gray, 2021). While entrepreneurs recognise their main problem in attracting qualified staff, the literature instead clearly states direct access to finance as the major obstacle for SMEs on their developmental journey (McGeever et al., 2022; OECD, 2019).

In comparison, global companies have a different approach to training and learning, treating it as a compulsory part of their development plans and a way to work with human talents. MNCs have specific platforms where they can upload all required training courses depending on the companies' economic sector and divide them into a set of compulsory courses and additional ones when employees can apply and participate if approved by the manager (Morsing, 2009; Smith et al., 2022; Torkkeli, 2022). These employees' development plans represent a career progression track, and all staff are encouraged to keep progressing in professional and interpersonal development. There is a clear distinction between management and leadership skills and how they are acquired.

Table 3. Participants quotations.

Representatives	Quotations	Insights from literature and critical discussion
Management development and training needs		
Participant of Company 1	"There's been no formal management training in the company because we felt it hasn't been required the what we do have though, is we're bound by these quality management systems".	Building management experience and expanding managerial skills represent essential pillars for the smooth transition from start-up to growth company (Liu et al., 2022; Grierson and Munro, 2018; Kuratko and Morris, 2018). Entrepreneurs' management development heavily relies on developing their expertise in teamwork skills, compulsory team learning, and networking. Despite the strong emphasis stated by the literature, entrepreneurs do not provide any management training nor encourage their teams. The role of managers as a critical element in the company and a change driver in sustainable development mechanisms (Nazim et al., 2024; Abdigapbarova and Zhiyenbayeva, 2023; Kerimbayev et al., 2023) would also be challenged by the growing rise of Artificial Intelligence (AI).
Participant of Company 2	"You know, we might get value from it now if we were to go back because of the fact that there's a bigger team, there is kind of various delegations now that need to be made".	
Participant of Company 3	"I suppose we're learning by doing regarding new ideas for, for, for leadership and management development".	
Participant of Company 8	"People who are to be managed, has changed... way that you can manage these people has changed massively. AI will come in terms of management is that it'll replace management because that is the easiest thing to replace".	
Participant of Company 4,5	"Allows for that and requires that we would support that, but we don't try and manage that. We really leave it to the engagement after individual pleasure".	
Positives and constraints of digital learning		
Participant of Company 1	"So the whole group would never met... and we had to present the project and it was like, who does what like it it just whereas you would have had it all sorted in an hour sitting around the table".	Technological literacy plays a crucial role in successful companies' digitalisation and helps to support significant changes in organisational structures and decision-making processes (Fatima & Abu, 2019; Moreno-Guerrero et al., 2020; Penco et al., 2022). Empirical findings highlighted the role of digital learning in diversifying whole business approaches, missing in-person communicative components and broad interest in AI as a main information source.
Participant of Company 3	"Since COVID we've gone online, which has been a positive on our with our programmes, so that's been a good game changer".	
Company growth - venture level		
Participant of Company 5	"So in other words couldn't take our system and put it into a large company because it wouldn't work, but it works for the size of ours".	Entrepreneurs have to engage with vast volumes of information to survive within high levels of uncertainty in the industry and the fast pace of change globally (St-Pierre et al., 2023). Thus, the team is a critical information holder (Santos et al., 2012; Ng and Kee, 2018; Tam & Gray, 2021). While entrepreneurs recognise their main problem in attracting qualified staff, the literature instead clearly states direct access to finance as the major obstacle for SMEs on their developmental journey (McGeever et al., 2022; OECD, 2019).
Participant of Company 11	"We're all sort of like pulling together to make the company work as opposed to it being a sort of like a structured hierarchy".	
Participant of Company 7	"In SME, you have to be the word generalist is the key you have. So you're moving along. You're never going too deep".	
Participant of Company 8	"Recruit somebody effectively recruit somebody is very, very challenging".	

Source: Authors elaboration (2025)

Management skills are seen as more practical competencies for working with staff, while leadership is already associated with empowerment, motivation, and engagement (Faizuniah & Chan, 2014; Parke & Campbell, 2014; Berry, 2011). However, knowledge sharing can be a weak point in global companies as it raises numerous concerns about the rationale of knowledge sharing. SMEs, in contrast, use online learning as an opportunity to find and learn the information regarding the required skill and acquire it promptly, showing the significant distinction between corporations and SMEs.

Critical Discussion and Policy Implications

Start-ups' successful progression is determined by the level of entrepreneur expertise and professional experience, which have to be expanded through training to develop their teamwork and teambuilding skills, bringing them to the core staff retention and economic prosperity (Tannenbaum et al., 2012; McNamara & Emn, 2020; Kearney & Lichtenstein, 2022). These skills development can be achieved through online learning, which, despite its obvious convenience, has to comply with the high demands of knowledge applicability and accreditation according to the Irish Quality and Qualifications Framework (QQI) standards. Online learning represents an advanced approach to expanding individual executive expertise to a venture level and effective teamwork and team expertise. However, benefits recognition is higher in corporations compared to SMEs (García-Feijoo et al., 2020; Filho et al., 2023).

Although entrepreneurial education actively aims to impact entrepreneurs' thinking, behaviour and feelings, it is still significantly disconnected from the learning theories, except for the components of experience-based learning with practice-oriented tasks (Hägg and Gabrielsson, 2020). Moreover, business hardly recognises the impact of learning theories on knowledge circularity, helping to build a foundation for system thinking and problem-solving to become more effective and reduce the risk of company failure (Kuratko and Morris, 2018; Gorman et al., 1997; Solomon et al., 1994).

Policymakers have to reassess their approach to funding distribution for educational and training support to companies that aim to develop their people skills quickly to grow sustainably and reduce technological start-up failure risk, as it puts Europe behind in overall competitiveness across multiple technology sectors (DigitalEurope, 2024; CSO, 2025). Additionally, Europe faces a critical tech talent shortage in key areas such as AI engineering, quantum computing and semiconductor specialists, which can be addressed by further investments in digital learning for up- and re-skilling and attracting human talents globally by competitive salaries and simplifying the hiring procedures. All these measures play a core role in further economic digital transformation, which can guide the implementation of rules, regulations, policies, and strategies related to the ICT sector across Europe (European Commission, 2023; OECD, 2024; DigitalEurope, 2024).

Despite the robustness and in-depth insights of qualitative data, the Irish tech sector choice as a case study has the limitations of being one case and does not allow for generalisation. Considering that a case study was not an inherently comparative approach to research and its objective was not statistical research, the research design was built to recognise its inherent value, which can be better understood from the constructionist viewpoint (Merriam, 2002; Stake, 1995; Hyett et al., 2014). Future studies could consider the possibility of a longitudinal research design, aiming to provide a better understanding of the consequences of training and changes in behaviour and cognitive constructions. Future lines of research might consider exploring the directions of team learning development for SMEs' smart growth and undertaking an empirical study with business owners and entrepreneurs. Online learning as a part of digital strategy might become a solution to make learning in a company accessible and cost-efficient (Leyer et al., 2023), as it allows to work with different sources of information simultaneously and raises

efficiency in team performance (Kirschner, Sweller, & Clark, 2006). Due to executives' impact on the company's learning environment (Asher & Popper, 2021), additional research is required to offer insights into how SME owners can better integrate staff with intercultural backgrounds (Bratianu et al., 2020).

Team expertise is crucial for SMEs, as they depend on one or a small team of decision-makers and digital learning addresses this demand. To overcome the lack of expertise and its challenges and constraints (Tannenbaum et al., 2012; McNamara & Emn, 2020; Kearney & Lichtenstein, 2022), entrepreneurs can use digital learning to progress with their levels of competitiveness and innovative and technological advancements (Petković & Lukić, 2014). Despite SMEs having an advantage in the speed reaction to ongoing changes due to their decentralised decision-making approach and developed network, they experience difficulties attracting qualified employees and direct access to finance (Lazarević & Lukić, 2018). Rapid and broad access to online learning can benefit building an effective and reliable team and, in turn, expand a firm's ability to operate and grow effectively (Tannenbaum et al. 2012). However, the management team's role in companies can be reassessed significantly with wide AI usage and its further improvement and expansion.

Conclusion

The development of human capital is a crucial pillar for success in small companies, as an entrepreneurial team of founders forms the management team, runs the company's daily operational performance, designs strategic plans and defines the firm's structure and strategy (Aldrich & Ruef, 2006; Mishra & Zachary, 2015; Aryadita et al., 2023). Therefore, receiving knowledge while working in teams and the ability to build an effective team become essential in SMEs, mitigating the risk of losing a team member with specific competencies and skills (Sun, 2020; Yang, 2020). Generally, entrepreneurs need extensive knowledge and information to start their businesses and for successful growth (Delmar & Shane, 2006). In contrast, complex technological and "knowledge-intensive" sectors require managerial, financial, and very specific tacit knowledge, putting executives in demand to be experts in their field (Eesley & Roberts, 2012). Therefore, founders in the technological sector acquire postgraduate qualifications and tend to constant professional development. Considering that most start-ups have at least two founders (Davidsson & Honig, 2003; Aryadita et al., 2023), empirical data emphasises a previous joint experience as an advantage, which helps to create positive relationships, effectively distribute management responsibilities between executives (Zheng, 2012; Leung et al., 2013).

SMEs apply online learning extensively to support the growth of their individual expertise in forming teams on their way to sustainable company growth (Aldrich & Ruef, 2006; Chwolka & Raith, 2012). However, the perception of online learning and the conceptual framework based on learning theories are neglected in many cases, except for the components of experience-based learning with practice-oriented tasks (Hägg and Gabrielsson, 2020). In the context of the twin transition and the knowledge economy, it is critical to consider to which extent the industrial sector connects to training and learning processes that enable team building and collaboration. Policymakers recognise Europe's lagging position behind leading States and Chinese economies in overall competitiveness, critical tech talent shortages, urgent requirements for investments in digital learning and simplifying the hiring procedures for global professionals (DigitalEurope, 2024; CSO, 2025). All these measures are essential for economic digital transformation, which were reflected in European strategies to ease existing dependence on the sector leaders (European Commission, 2023; OECD, 2024; DigitalEurope, 2024). However, businesses and policymakers have started to recognise the high demand for knowledge circularity between industry, research and academia (Kuratko and Morris, 2018; European Commission, 2023; OECD, 2024).

This paper provides insights into digital learning and its possible applications for entrepreneurs' management development and their company's resilience in a changing economic environment. An extensive literature review combined with qualitative semi-structured interviews obtained from technological start-up CEOs highlighted the growing requirement for expertise and digital literacy among them in the space of restricted access to finance. Future research is needed to expand the insights from different sectors and consider a more focused data-driven approach.

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