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Adoption of AI and Digital Technologies in Early-Stage International Student Entrepreneurship: A case study from Vaasa, Finland

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ABSTRACT:

As digital technologies and Artificial Intelligence (AI) become increasingly embedded in entrepreneurial activities, their role in shaping nascent ventures has gained growing attention from scholars. For international student entrepreneurs, who often operate under contextual conditions shaped by limited networks, language barriers, and unfamiliar institutional environments, digital technologies may play a particularly significant role in mediating these challenges. While existing literature highlights the potential of digital technologies to reduce barriers and enable entrepreneurship, there remains limited understanding of how these tools are used in early-stage ventures under such conditions.

This thesis examines how international student entrepreneurs use digital technologies and AI during nascent and early-stage venture development, drawing on perspectives from mixed embeddedness theory and digital entrepreneurship theories. The study adopts a qualitative approach based on semi-structured interviews and thematic data analysis.

The findings show that digital technologies are integrated into key entrepreneurial activities, including customer acquisition, communication, and operations, functioning as essential infrastructure for market participation. In contrast, AI, particularly Generative AI (GenAI), is primarily used in a task-based and non-strategic manner. Overall adoption remains limited in depth and is driven by accessibility, familiarity, and immediate operational needs.

The study contributes to the literature by showing that structural constraints are not solely determinative but can be partially mitigated through the interaction of human capital and the practical use of digital technologies and GenAI. The findings highlight the importance of strengthening ecosystem support to enhance international student entrepreneurs’ ability to effectively use digital technologies and point to the need for further research on the evolving role of AI in entrepreneurial contexts.

KEYWORDS: Artificial Intelligence, language models, GenAI, digital technologies, small-scale entrepreneurs, migrant entrepreneurship, international student entrepreneurship

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1 Introduction

1.1 Background

The Organization for Economic Co-operation and Development (OECD)'s research on international student mobility shows a continuous expansion in recent years, highlighting the importance of this group. The number of international students studying in OECD countries increased from 3.0 million to more than 4.6 million between 2014 and 2022, despite the disruption caused by the COVID-19 pandemic (OECD, 2025a). This indicates that international mobility is not a temporary movement but a continuing structural trend in higher education and skilled migration. This phenomenon can be seen in Finland, an OECD's member, with the Finnish Immigration Service reporting that Finland received 14,163 first residence permit applications on the grounds of studies in 2024 (Maahanmuuttovirasto, 2025). Out of these permits, 13,000 were students starting their degree studies in Finnish higher education institutions (Finnish National Agency for Education, 2025). This was the highest number recorded and approximately 10% more than in the previous year. These statistics show that Finland is attracting a growing number of international students and that international student mobility has become increasingly relevant in the Finnish higher education context.

During their studies or after graduation, the students require participation in the host country's economy to obtain legal resident status. While there are policies that encourage international graduates to remain in the country and engage in employment or entrepreneurial activities, a recent survey shows a different outcome. Nearly 90% of international students express willingness to stay in Finland but approximately one-third leave the country within one year after graduation. Lack of access to suitable employment opportunities drives this exodus, particularly due to limited work experience and barriers in entering the Finnish labor market (Suomen Ekonomit, 2024). The amendments to the three-to-six-month unemployment rule that came into force in June 2025 also means that the permit holders need to leave Finland if they cannot secure a job within a given period of time of three to six months (Ministry of Economic Affairs and

Employment, 2025). Given constraints in traditional employment, entrepreneurship can be one pathway in which international students gain access to the local economy and remain in the host country. Finland provides a relevant context for examining the use of digital technologies and AI in entrepreneurship due to the prominent level of digitalization and strong human capital. According to the Digital Economy and Society Index, 79% of the population possesses at least basic digital skills, and digital tools are driving economic and social activities. Digital capabilities are not only a source of competitive advantage but also a prerequisite for employment, participation, and inclusion in society (Finnish Government, 2024). However, such aggregate indicators describe the general population and do not account for differences across specific groups. International student entrepreneurs operate within the same digital environment but may face additional challenges related to language, institutional familiarity, and access to local networks.

Theoretically, Kloosterman et al. (1999) explain this development through the concept of mixed embeddedness, which emphasizes that entrepreneurial activities are shaped by the interaction between personal resources and the structural conditions of the host environment (Kloosterman et al., 1999). International student entrepreneurs represent a specific subgroup within this framework, as they often acquire educational capital, but face constraints related to limited local networks, institutional unfamiliarity, and barriers in the labor market. These constraints are particularly pronounced in the nascent stages of ventures, where founders must secure resources, build networks, and understand the institutional environment to turn their ventures into viable businesses. Early-stage ventures also face higher risks of failure, which makes this phase especially important to study. This research considers registered businesses that are less than 3.5 years old as early-stage ventures (Reynolds et al., 2005, p.210,).

The barriers to starting a company have been lowered given the recent and ongoing advancement of digital technologies, new digital platforms, and infrastructure (mobile business applications, the internet of things, cloud computing, data analytics, fintech) (Lamine et al., 2023, p.1). At the early stage, international student entrepreneurs can use digital tools and Artificial Intelligence (AI) to offset disadvantages related to limited networks, institutional unfamiliarity, and restricted access to resources. This can be considered a relevant strategy as digital entrepreneurship research highlights how digital platforms and tools enable new ventures to operate flexibly and overcome traditional barriers through accessible and scalable solutions (Nambisan, 2017; Ojala et al., 2018).

1.2 Research Problem and Gap Identification

Despite this growing body of research, much of the existing literature focuses on technology-driven firms or ventures located in larger entrepreneurial ecosystems. At the same time, research on international student entrepreneurs remains fragmented, as studies examine migrant entrepreneurship and student entrepreneurship as separate domains rather than addressing the specific experiences of international students engaged in entrepreneurship.

From a theoretical perspective, existing research does not clearly define international student entrepreneurs as a distinct subgroup within migrant entrepreneurship, nor does it sufficiently explain how digital tools and AI are used across different early-stage business activities.

From a contextual perspective, prior research has largely focused on metropolitan and well-developed entrepreneurial ecosystems, while small-city environments remain underexplored. Vaasa provides a relevant case study because its entrepreneurial ecosystem is smaller in scale compared to metropolitan areas.

From a business perspective, international student entrepreneurs remain underexplored in the literature, particularly in relation to their use of digital technologies in early-stage venture development. This is significant because entrepreneurship represents one career pathway through which international students build economic participation, professional integration, and long-term attachment to Finland. Given that student retention and post-graduation stay are important policy concerns, limited knowledge about how this group creates and manages ventures also limits the ability of universities, entrepreneurial support organizations, and local stakeholders to provide appropriate forms of support.

1.3 Research Questions

The aim of this thesis is to investigate how international student entrepreneurs based in Vaasa adopt and use AI and digital tools across key early-stage business activities.

The research question is: How are AI and digital tools adopted and used across key early-stage business activities by international student entrepreneurs?

The objectives are:

- To define international student entrepreneurs as a sub-group of migrant entrepreneurs
- To identify how digital and AI tools are used in different activity domains (business setup, customer acquisition, daily operations, and growth) and for what purposes.
- To examine the factors influencing AI adoption in a small-city context.

This study focuses on international student entrepreneurs who have registered their firm and either have an active student status at a university or are recent graduates. The analysis is limited to early-stage ventures, typically within the first three and a half years of operation, where entrepreneurs are still developing their business models, customer base, and operational and growth processes. The study does not focus exclusively on digital startups but includes a range of business types, including service-based and physical businesses. The emphasis is on how the entrepreneurs utilize digital and AI tools to support their entrepreneurial activities and overcome the structural barriers they face as migrants.

1.4 Intended Contributions

This thesis contributes to the current literature on migrant entrepreneurship by extending attention to the underexplored group of international student entrepreneurs. In doing so, it provides empirical insights into how this group develops and manages early-stage ventures using digital technologies.

The thesis also contributes by examining Vaasa as a small-city context. Vaasa city has a population of 70,000 inhabitants, which is smaller than major Finnish urban cities like Helsinki, with close to 700,000 inhabitants (The Population of the Vaasa Region Is Diverse, n.d.). By focusing on a regional environment that differs from larger metropolitan ecosystems, the study offers a context-specific case that may help inform how universities, support organizations, and other ecosystem actors can better support international student entrepreneurs.

Finally, the study provides practical insight into the digital tools and AI-based applications used by early-stage entrepreneurs. By identifying what kind of tools are being deployed and how such technologies are applied across different business activities, the findings may offer useful knowledge both for future international student entrepreneurs and for those seeking to support their entrepreneurial development.

This thesis is structured into five chapters. Chapter 1 introduces the background, research problems, research aim, and intended contributions of the study. Chapter 2 presents the literature review for migrant entrepreneurship and defines international student entrepreneurs as a sub-group of migrant entrepreneurs. The chapter also covers early-stage business activities, digitalization in those entrepreneurial processes, and the factors influencing the adoption of AI, as well as its benefits and limitations. Chapter 3 outlines the research methodology, including qualitative data collection and thematic analysis methods. Chapter 4 presents the empirical findings from the interviews and Chapter 5 discusses the results in relation to existing literature and concludes the study.

2 Literature Review

In Chapter 2, the author reviews the core literature and its development on migrant and student entrepreneurship, structural conditions that influence international students selecting entrepreneurship as a career path. In addition, the chapter will address four stages of new ventures, AI and digital tools used during these stages and the support of the local ecosystem. The objective of this review is to provide insights into how foreign-born student entrepreneurs use technologies to overcome structural barriers and navigate the local ecosystem they operate in, especially the university ecosystem.

2.1 International Student Entrepreneurship

There is a challenge in defining migrant entrepreneurship because scholars use a variety of overlapping concepts and categories to describe entrepreneurial activities among foreign-born residents. Ram et al. (2017) note that the field includes a growing range of categories used, such as immigrant entrepreneurship, ethnic minority entrepreneurship and migrant entrepreneurship, as researchers attempt to recognize social differences without oversimplifying migrant groups (Ram et al., 2017, p.5). A commonly used concept is immigrant entrepreneurship, which is the establishment or operation of businesses by individuals who were born outside the host country, typically referring to first-generation migrants engaging in entrepreneurial activity within the destination economy (Levie, 2007; Brzozowski et al., 2017).

The Global Entrepreneurship Monitor defines entrepreneurs as adults who are either in the process of starting a business they will partly or fully own or who currently own and manage an operating business (Reynolds et al., 2005). For a comprehensive definition, this thesis uses the term migrant entrepreneurs to describe the foreign-born individuals who moved to Finland through the various pathways and subsequently started their businesses, taking the role of owners or co-owners. The term migrant entrepreneurship is used to reflect this group's broader mobility background as internationally mobile individuals. Within this broader field of migrant entrepreneurship, international student entrepreneurs can be viewed as a distinct subgroup of migrant entrepreneurs. They are different from migrant entrepreneurs, who relocate primarily for employment or economic reasons. The foreign students initially migrate for education; they later develop entrepreneurial activities during their studies or subsequently after graduation.

Student entrepreneurs differ from those who start businesses outside the academic ecosystem. This is because their decisions are driven by university education and they operate within the university context with resources such as entrepreneurship education, mentorships, peer networks, and innovation programs (Passavanti et al., 2023, p. 2; Ferrante et al., 2019). Ferrante et al. (2019) argue that formal training and education reduce uncertainty when starting a business and contribute to students' entrepreneurial human capital. Human capital refers to the cognitive abilities and non-cognitive traits that allow humans to identify and leverage business opportunities to create economic value. These abilities are linked to factors such as analytical thinking, creativity, health, personality, and occupational success that ultimately guide career choices. In addition, student ventures contribute to the knowledge transfer generated within universities to the market through the creation of new products, services, or business models. Thus, these student ventures help transform academic knowledge into practical applications and can contribute to employment creation and regional economic development (Ferrante et al., 2019, pp.1815-1816).

Despite the growing research on student entrepreneurship, much of this literature considers student entrepreneurs as a homogeneous group, leaving out international students as a subgroup of migrant entrepreneurs. As a result, the migrant dimension of their entrepreneurial activities is often not explicitly addressed. In this study, international student entrepreneurs are understood as students or recent graduates (within the past three years) who are actively involved in revenue-generating entrepreneurial activities.

2.2 Drivers of International Student Entrepreneurship

International student entrepreneurship is not solely driven by individual motivations but by a combination of structural and social factors. To understand this phenomenon, this study is anchored in the mixed embeddedness framework, which serves as the primary theoretical lens to explain that entrepreneurial behavior is formed by their social networks and the broader structural conditions such as access to the labor market or migrant policies. Building on this perspective, the study will also consider the role of universities in influencing entrepreneurship as an alternative career pathway for international students.

2.2.1 Mixed Embeddedness as the Theoretical Lens

This study draws on the mixed embeddedness framework to explain the conditions in which international students choose entrepreneurship. The framework emphasizes how entrepreneurial activities are influenced by both individual resources and the institutional environment, which is particularly relevant for international students operating in a foreign context. Kloosterman et al. (1999) argue that migrant entrepreneurs' social and economic positions do not work in silos and the outlook on opportunities for moving up the social ladder depends on multiple interacting factors. This argument forms the foundation of the mixed embeddedness framework, which emphasizes the combined influence of social networks and structural conditions in the host country. Social networks refer to the resources and support coming from close connections such as family members and friends. Together with wider economic opportunities, regulatory frameworks, and institutional conditions, these factors shape their entry into the market and chances of improving their socio-economic position (Kloosterman et al., 1999, pp.252-253). Migrant entrepreneurs with social resources operate within broader opportunity structures, which are the market conditions and institutional environments that determine which types of entrepreneurial opportunities are accessible to them. Factors such as welfare systems, labor market regulations, housing policies, and business regulations determine entrepreneurial opportunities at national, sectoral, and local levels (Kloosterman et al., 1999, p.258).

The role of labor market exclusion further explains why migrants may turn to entrepreneurship. Kloosterman et al. suggest that unemployment among immigrants in the Netherlands remained significantly higher than among the native population, pushing many migrants toward self-employment as an alternative economic strategy (Kloosterman et al., 2002, p.253). Similar phenomena in self-employment for income maximization have been observed in other research, which indicates that barriers such as languages, discrimination, difficulties in qualification recognition, and limited access to professional networks may restrict migrants' opportunities in wage employment (Levie, 2007, p.146; Naudé et al., 2017, pp. 5–7).

As a result, migrant entrepreneurs often enter sectors with low barriers to entry, such as retail, wholesale, and restaurants as these sectors demand limited capital and formal qualifications. While these sectors provide accessible entry points, they are also characterized by "cut-throat" competition, low profit margins and labor-intensive. Business survival thus often depends on flexibility, long working hours, and cost-reduction strategies. In some cases, the strategy is to entrust family labor or informal economic practices to remain competitive in saturated markets. Entrepreneurs also take advantage of social capital through social networks of relatives, co-nationals, or co-ethnics to gain flexible access to information, capital, and labor at relatively low monetary cost. The use of social capital within the current opportunity structure gives these businesspeople a competitive advantage, both within the formal and informal economies (Kloosterman et al., 2002, p.258; Ram et al., 2017, p.6).

In recent developments of the field, Ram et al. (2017) highlights the mixed embeddedness framework as a major theoretical development but strengthens this perspective with areas such as the role of regulation and market ghettoization. They point out that there is a lack of comparative research testing how regulation affects migrant entrepreneurship, and existing evidence suggests complex outcomes of regulations. Recent studies demonstrate that a stricter regulatory environment, when accompanied by stronger state support mechanisms, can still lead to positive outcomes. The study presented that Pakistani firms in highly regulated Scandinavian countries outperform, when compared to those in a more market-oriented environment of the United Kingdom. Ram et al. (2017) also discuss the market ghettoization, which refers to the concentration of migrant entrepreneurs in low-value sectors characterized by low entry barriers and high competition. From Kloosterman et al.'s mixed embeddedness framework, this market segregation is a structural disadvantage limiting opportunities for business growth. However, studies of migrant businesses in the UK imply that some firms operating within these sectors still achieve high levels of profitability, especially when entrepreneurs can mobilize financial capital or resources accumulated prior to migration. While market ghettoization remains a common structural constraint, financial capital may be the decisive factor to migrant business success (Ram et al., 2017, pp.7-9). In summary, the mixed embeddedness theory provides an understanding that international student entrepreneurs are influenced by the structural conditions in relation to networks, labor market access and institutional environments. However, the framework has been developed in the context of traditional migrant entrepreneurs who do not spend time in the local educational system, often face strong labor market exclusion and limited access to resources. In contrast, international students may have different access to institutional support for being a part of the university ecosystem, which can distinctively shape their entrepreneurial pathway. This suggests while mixed embeddedness is valuable to explain constraints, it may not fully explain the specific conditions under which international students operate.

2.2.2 Why international students choose entrepreneurship as an alternative pathway

As mentioned above, international student entrepreneurs are seen as migrant entrepreneurs who benefit from the university ecosystem as they have gained valuable education and skills. Thus, international student entrepreneurs are at the intersection of migrant entrepreneurs and student entrepreneurs. They may experience limited professional networks, unfamiliarity with business environments and regulatory constraints from the labor market that push them to start their own business (Ram et al., 2017; Kloosterman et al., 2002). At the same time, non-local students may consider entrepreneurship a viable career with uncertainty risks. This is because universities have been exposing students to business ownership ideas and equipping them with skills and knowledge through education, startup programs and peer networks. It is thus crucial to consider universities as important environments that foster entrepreneurial awareness and encourage students to consider entrepreneurship as a potential career option (Ferrante et al., 2019; Passavanti et al., 2023, p.7).

In the Finnish context, international students represent a growing group of highly skilled migrants that universities and policymakers increasingly aim to retain after graduation (Ministry of Economic Affairs and Employment, 2022). However, international graduates may still face challenges when entering the Finnish labor market, particularly in smaller cities where employment opportunities may be limited. In Table 1, a report from Tilastokeskus, Statistics Finland's databases, compares the employment rate of students studying in Helsinki and Vaasa in 2024, based on the level and type of education. Data shows that except at the doctoral or equivalent level, students' employment in Vaasa is lower regardless of levels or types of degree, with the largest difference being 7.3% lower in employment rate for students with university bachelor's degree in Vaasa.

Table 1. Employment of students by type of education, level of education and area in 2024, (Tilastokeskus, 2024).

	Students	Employed students	Employment rate of students, %
2024			
Education leading to a degree			
Helsinki			
Polytechnic bachelor's degree	21,035	12,803	60.9
University bachelor degree	18,177	9,817	54.0
Higher polytechnic degree (Master)	3,675	3,123	85.0
Higher university degree (Master)	17,287	11,184	64.7
Doctoral or equivalent level	5,127	4,433	86.5
Vaasa			
Polytechnic bachelor's degree	4,014	2,179	54.3
University bachelor degree	2,744	1,280	46.6
Higher polytechnic degree (Master)	404	314	77.7
Higher university degree (Master)	1,392	827	59.4
Doctoral or equivalent level	261	232	88.9

Obs: Data for the years 2020 2023 corrected on 4 February 2026.

In such situations, entrepreneurship may emerge as one possible pathway for international students to remain economically active while utilizing their education, skills and local networks.

2.3 Early-stage venture activities and challenges

To understand how entrepreneurial activities are organized and the challenges they face when starting a business, this study adopts an activity-based perspective of early-stage venture development. This perspective focuses on the actions taken by entrepreneurs when establishing and developing their ventures and provides a useful foundation for examining how digital technologies are utilized across different stages of venture development.

2.3.1 Definition of early-stage nascent ventures

Previous researchers suggest that new venture creation is a process of entrepreneurial actions instead of the emergence of a firm. The actions undertaken by individuals to develop a venture are defined as the "process" and is one interdependent dimension of new venture creation (Gartner, 1985; Lumpkin & Dess, 1996; Davidsson, 2015; Walsh & Cooney, 2023). In this perspective, researchers have enumerated these six actions entrepreneurs take to bring a venture from ideation to existence, in which the order does not imply any sequence. The six activities are: (1) the entrepreneur's identification of business opportunities, (2) accumulation of resources, (3) marketing of products and services, (4) production of the product, (5) formation of organization, and (6) respondent to government and society (Gartner, 1985, pp. 669-700).

While the process perspective helps explain what entrepreneurs do in creating ventures, there is also entrepreneurship literature that helps distinguish early-stage ventures according to their stage of development. In Figure 1, the Global Entrepreneurship Monitor (GEM) of entrepreneurial activities across forty-one countries groups both nascent business owners and owner-manager of a young firm under the total early-stage Entrepreneurial Activity.

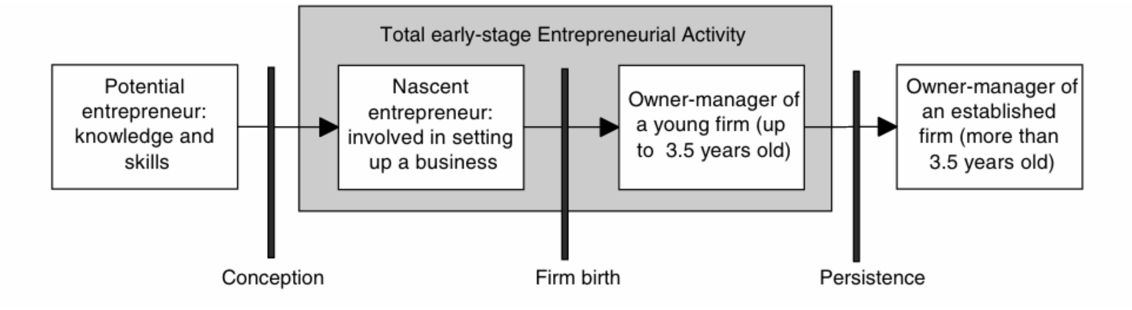

Figure 1. Entrepreneurial process and GEM operational definitions (Reynolds et al., 2005).

The authors of GEM define nascent entrepreneurs as individuals who have moved beyond discussing a business idea and have initiated concrete gestation of setting up a business. Young firms are those that have paid salaries and wages for more than 3 months and less than 3.5 years (Reynolds et al., 2005, p.210). These distinctions suggest that the early stage includes both nascent entrepreneurial activity and the first years of business operation. This study defines early-stage ventures as both time-based and process-based, referring to nascent ventures and young firm stages of up to 3.5 years. These businesses are registered by international students or recent graduate entrepreneurs, who take the roles of sole traders or co-owners of companies. This definition is suitable for the research because many of the ventures examined are small, owner-managed businesses that develop gradually throughout the entrepreneurs' education or upon their graduation. The time-based definition supports the longer time taken to establish the firm and the activities-based definition supports the fact the entrepreneurs work in different industries but go through the same venture processes.

2.3.2 Early-stage entrepreneurial activities

Entrepreneurs engage in a variety of activities during the early stages of venture development. Researchers refer to these as gestation activities, which represent the concrete actions undertaken to move a venture from idea to operation (Carter et al., 1996; Davidsson, 2015). While different studies conceptualize early-stage entrepreneurship using varying frameworks, they consistently emphasize the nascent activities of planning, gathering of resources, market validation, and organizing operations (Carter et al., 1996; Tuazon et al., 2018; Walsh & Cooney, 2023). Tuazon et al. (2018) categorize entrepreneurial activities into business planning and business execution, distinguishing between preparatory and implementation-oriented actions. Some researchers refer to the signals of viable ventures as “start-up indicators”, representing measurable outcomes that demonstrate whether a nascent venture has progressed into an operative business. Common start-up indicators identified in these studies include generating sales, achieving positive cash flow, and paying taxes (Carter et al., 1996, p.158; Walsh & Cooney, 2023, p.936). These start-up indicators can mean the nascent venture has successful market entry, customer acquisition, and financial sustainability.

Rather than being viewed as solely outcomes, these indicators should also be considered as entrepreneurial activities, particularly within the domains of customer acquisition and daily operations. To provide a clearer analytical framework, this study groups these gestation activities into four domains: setup and planning, customer acquisition, daily operations, and growth. This categorization is not chronological, since entrepreneurs carry out several of these activities simultaneously, for example a business can attract customers while in the process of setting up. The framework is used to clarify where and how digital tools and AI may be adopted across the early developmental activities of a business.

In Table 2, Carter et al. (1996) provides insight into the types of activities undertaken by nascent entrepreneurs during the early stages of venture development. Their study tracks start-up behavior over the first 12 months, demonstrating that the activities in early-stage are overlapping rather than a fixed sequence, supporting an activity-based perspective of entrepreneurship. The domain of setup and planning activities involve the preparation and organization of the business. These behaviors to establish a new business are called “precursor activities” and are part of the gestation process that precede the establishment of a functioning venture. Entrepreneurs need to prepare a business plan, buy facilities and equipment, form legal entities, and fund their ventures (Carter et al., 1996, pp. 155–156). Recent research further emphasizes the importance of evaluation-related activities, such as defining market opportunities and validating business concepts, in shaping early venture development (Walsh & Cooney, 2023, p.936).

Table 2. Activities in the first 12 months (Carter et al., 1996).

	Started			
	1mo	3mo	6mo	12mo
Discriminating activities				
Bought facilities, equip.	32	38	53	59
Developed models	0	0	6	6
Got financial support	21	24	27	32
Other precursor activities				
Organized start-up team	24	32	44	56
Devoted full time	15	18	29	29
Asked for funding	24	27	41	44
Invested own money	41	53	68	71
Looked for facilities	44	47	59	65
Applied license/patent	12	15	27	35
Saved money to invest	18	24	32	41
Prepared plan	18	27	32	38
Formed legal entity	6	9	21	27
Hired employees	3	6	9	21
Rented facilities, equip.	9	9	12	12
Start-up indicators				
Sales	29	35	50	65
Positive cashflow	15	15	21	32
D&B credit listing	0	0	3	6
Unemployment insur.	3	3	12	15
FICA	15	12	27	32
Filed federal tax	15	15	27	41

Customer acquisition refers to strategic activities businesses use to acquire new clients. This is a critical aspect of business growth as loyal customers bring increased revenue and potentially support market expansion. IBM suggests the three-step process: engaging with potential leads, nurturing those leads until they are ready to make a sale, and turning those leads into customers (Hayes & Downie, 2025). Prior studies highlight that early engagement with customers and promotion are important to move from idea validation to actual business operation (Carter et al., 1996; Tuazon et al., 2018). Performance of these marketing activities is better when the entrepreneurs are clear about the solutions to the target market (Tuazon et al., 2018, p.17). More recent work also identifies marketing and income generation as key components of opportunity exploitation in early-stage ventures (Walsh & Cooney, 2023, p. 936).

Daily operations encompass the management of daily functions once the venture becomes operational with the goals of generating profit and increasing enterprise value (Business Operations, 2023). Entrepreneurs who successfully establish ventures tend to transition quickly into managing day-to-day business activities (Carter et al., 1996, pp. 157-161). In the growth domain, companies carry out activities to boost sales. As sales increase rapidly, businesses start seeing profit once they pass the break-even point and experience positive cash flow (Business Life Cycle, 2026).

2.4 Usage of digital technologies and AI in new ventures

Scholars have been increasingly recognising digital technologies as the mechanisms that reshape entrepreneurial processes by expanding access to resources, information, and markets. Within entrepreneurship research, this transformation is often discussed in relation to digital entrepreneurship, which highlights the roles of digital artifacts, digital platforms, and digital infrastructures in enabling venture creation and operation (Nambisan, 2017). More recently, AI, as a more advanced form of digital technologies, has been considered external enablers that reduce uncertainty and lower entry barriers to entrepreneurship (Chalmers et al., 2021). When considered alongside the mixed embeddedness framework, these perspectives suggest that digital technologies may play a mediating role and provide alternative means to access resources and markets. At the same time, AI may function as a compensatory mechanism, helping international founders to overcome some of the limitations associated with operating in a foreign context.

2.4.1 Digitalization and digital technologies

Digitalization is the transformation of business activities through the integration of modern hardware and software, replacing or enhancing analogue processes through digital systems, enabling new ways of organizing and conducting business activities (Plecko et al., 2023, p. 1). In the context of this study, digitalisation explains how business owners diverge from manual or offline practices and rely on digital tools and AI to either replace these activities or improve how they are carried out. Within entrepreneurship research, this transformation is conceptualized as digital entrepreneurship, which captures the intersection between entrepreneurial activity and digital technologies, including internet-based infrastructures, information and communication technologies (Paul et al., 2023, p. 1). This perspective is adopted because it does not restrict digital entrepreneurship to internet-based firms but includes non-digital ventures that incorporate digital technologies into core business activities.

Nambisan offers a central conceptualization of this transformation and distinguishes between digital artifacts, digital platforms, and digital infrastructure as the core elements of digital entrepreneurship (Elia et al., 2020; Nambisan, 2017). Digital artifacts can be applications or digital components embedded in products or services, supporting the users given their specific functions. The digital artifacts can be the apps that run on personal devices or household appliances, or an element of bigger ecosystems of applications that operate on digital platform (Ekbia, 2009; Kallinikos et.al, 2013). Digital platforms represent shared architectures that host these complementary offerings (Tiwana et.al, 2010; Nambisan, 2017). For example, Google and Apple, the two tech giants, develop Android and iOS as their mobile operating system to enable apps to run on the respective platforms. These platforms are attractive working environments for entrepreneurs because these platforms can handle marketing, distribution and production, while the firms focus on strengthening their specializations (Nambisan, 2017, p.1032; Paul et al., 2023, p.7).

Digital infrastructure encompasses systems such as cloud computing, social media, and data analytics that provide capabilities for communication, collaboration, and computation in support of innovation and entrepreneurial activity (Nambisan, 2017, pp. 1031-1032; Plecko et al., 2023, p. 2). The emergence of such infrastructures has significantly expanded access to entrepreneurship, contributing to what is often described as the “democratization” of entrepreneurial activities. This shift has enabled a more diverse group of individuals to participate in entrepreneurial opportunity identification, idea development, testing, funding, and venture creation. For example, digital infrastructure such as cloud computing and data analytics enables new ventures to build and test business ideas at lower cost (Nambisan, 2017, p. 1032). This means that founders might not require substantial upfront investment to be able to gain access to on-demand resources, build prototypes and obtain feedback from a broader potential client. Overall, the multi-layered nature of digital technologies implies that entrepreneurs do not rely on isolated tools to support their business but organize business activities around these interconnected layers.

Entrepreneurs adopt digital technologies for both opportunities and out of necessity. Digitalization enables cost saving strategies, operational efficiency, innovation, and access to new markets, while helping ventures remain competitive in dynamic environments (Plecko et al., 2023, p. 1; Paul et al., 2023, p. 2). Digital technologies are no longer external tools but are embedded within both entrepreneurial processes and outcomes, making these processes more flexible and less constrained by traditional boundaries of time and location (Lamine et al., 2023, p.1). This embeddedness allows businesses to modify their digital artifacts and continuously deliver new function and value offerings to their customers (Nambisan, 2017, pp. 1032-1033).

Overall, these conceptualizations are relevant for examining how AI and digital technologies are adopted by international student entrepreneurs because it explains the advantages these technologies bring, such as lowering barriers to entry and enabling access to distributed resources. For international student entrepreneurs, who may face constraints related to capital, networks, and institutional embeddedness, digital technologies serve as a critical enabler that supports participation in entrepreneurial processes.

2.4.2 Digitalization and the transformation of early-stage entrepreneurial activities

As mentioned above, digitalization is significant for entrepreneurs to gain a competitive advantage, as digital technologies lower dependence on location-specific resources and institutional constraints. The applicability of digitalization is not limited by business type (physical, online, or hybrid), since it is defined as the transformation of business activities (Plecko et al., 2023, p. 1). Since core activities such as setting up, marketing, operations, and customer management exist across all ventures, digitalization can be adopted regardless of firm's operational type. While existing literature does not categorize entrepreneurship into uniform domains used in this research, they consistently identify key processes such as opportunity recognition, market engagement, and venture development (Chalmers et al., 2021, pp. 1033–1038; Duong, 2025, p.2691). In this study, these processes are grouped into four activity domains to show how digital technologies are integrated across early-stage entrepreneurial activities.

Digitalization transforms entrepreneurial activities through three key mechanisms: increased flexibility in modifying business processes, improved access to information, and expanded connectivity through digital platforms. Digital technologies are modular and reconfigurable, which makes it easier to adapt offerings and business functions over time (Yoo et al., 2010). They also facilitate information acquisition through digital platforms and support new forms of business model development (Kraus et al., 2019). In addition, digital platforms allow ventures to reach wider networks and participate in multi-sided market environments that are less constrained by location (Nambisan, 2017; Ojala et al., 2018). Together, these features suggest that digitalization does not simply support entrepreneurial processes but alters how they are performed.

Digitalization reshapes the setting up phase through iterative experimentation, allowing entrepreneurs to use "trial-and-error learning," where they screen and adopt digital technologies into business models to search for a viable business logic before committing heavy capital (Steininger, 2019, pp. 367-368). The literature also highlights the emergence of digital business models with multiple dimensions, including the digitization of goods and services, distribution channels, stakeholder communication, and internal processes (Kraus et al., 2019, p. 356). While not all early-stage ventures operate with a digital business model, they may selectively adopt digital technologies across these dimensions, resulting in varying degrees of digitalization. A critical part of setting up an online presence is ensuring the business is platform ready, meaning it is technically capable of operating within shared architecture ecosystems (Paul et al., 2023, p.7; Nambisan, 2017, p. 1032).

Digitalization changes venture creation activities by enabling entrepreneurs to engage with different stakeholders through digital channels, allowing them to identify target market demand and innovate their offerings from the insights gathered. At the activity level, these technologies influence how opportunities are identified and exploited by enabling new forms of value creation and interaction (Steininger et al., 2022, p. 2). They facilitate information acquisition through access to digital platforms (Kraus et al., 2019, p. 363). This transformation reduces reliance on traditional methods, allowing entrepreneurs to complete these activities more efficiently, reducing administrative complexity, and increasing accessibility to information and resources that would otherwise require prior experience or local embeddedness.

In addition, digital technologies are shown to also support customer acquisition through online sales, digital marketing, and commerce through platforms, websites, and social media networks (Plecko et al., 2023, p. 3). This feature allows entrepreneurs with limited financial resources to acquire customers without having to heavily invest in traditional forms of outreach. Digital platforms also enable firms to reach customers globally and operate across multi-sided markets, facilitating rapid scaling and internationalization (Ojala et al., 2018, p.726).

While the current research provides a broad theoretical foundation on digitalization and digital entrepreneurship, the existing literature tends to focus on digitally intensive or platform-based ventures, offering limited insights into smaller and resource-constrained businesses. In addition, existing studies do not clearly explain how digital technologies are integrated across activity domains in early-stage development. As a result, there remains limited understanding of how digital tools are adopted and used across different entrepreneurial activities in the nascent stage.

2.4.3 AI and Entrepreneurship

There are many different definitions of AI in the literature. Mukhamediev et al. (2022) defines AI as the capability of a computational system, including digital computers or robots, to execute tasks traditionally performed with human intelligence. It can also be said that AI utilises software and hardware to emulate and replicate human behaviour and reasoning (Mukhamediev et al., 2022, p.4). Haenlein and Kaplan (2019) define it more functionally as a system's capacity to accurately interpret and learn from external data to use those insights to achieve specific goals through flexible adaptation (Haenlein & Kaplan, 2019). Unlike traditional computer programs that follow fixed instructions, AI systems can improve and adapt based on experience (Chalmers et al., 2021). As seen in Figure 2, AI is often used as an umbrella term to describe various technologies, including machine learning, computer vision, and natural language processing (Mukhamediev et al., 2022, pp. 4-5).

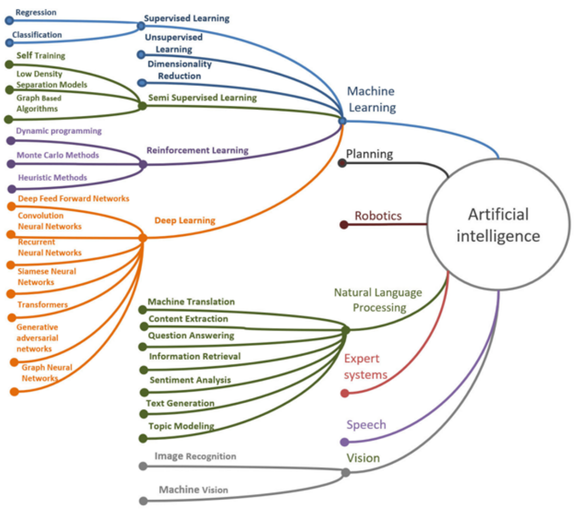

Figure 2. Domains of AI (Mukhamediev et al., 2022).

Within the broader landscape of digital technologies enabling entrepreneurship literature, AI is increasingly positioned as one of the most transformative and promising developments (Obschonka et al., 2020). In this context, a growing number of scholars use the term "external enablers" to describe innovative technologies that reduce inherent challenges of starting a business such as uncertainty and large resource requirements, making entrepreneurship more accessible to people regardless of their background (Lamine et al., 2023, p.1). From this perspective, AI is described as a digital external enabler and a powerful tool that reshapes the core of entrepreneurial procedures (Chalmers et al., 2021, p.1032). Some AI applications can depend on large language models (LLMs), which are advanced deep learning algorithms that can identify patterns within vast datasets to produce predictions and inform decisions (Haenlein & Kaplan 2019; Dencik et al., 2023). With this capability, AI is said to significantly enhance entrepreneurial processes across various domains, including decision-making, opportunity recognition, product development, and customer engagement (D'Angelo et.al, 2026, p.4).

2.4.4 Generative AI in Early-Stage Entrepreneurship: Benefits and Adoption Factors

While AI encompasses a broad range of technologies, recent developments in generative AI (GenAI) have made these tools more accessible and user-friendly, engaging hundreds of millions, including early-stage entrepreneurs (Obschonka et al., 2025, p.635). Unlike traditional AI systems that often require significant data, infrastructure, and technical expertise, GenAI tools can be used with relatively low entry barriers, allowing entrepreneurs to apply them across various business activities. Figure 3 shows that GenAI tools can support tasks during the exploration with idea generation, development phase with business planning, exploitation phase with suggesting growth strategies. AI reduces information asymmetry by analyzing large datasets, generating insights, and making relevant information more accessible to entrepreneurs, reducing information asymmetry, and supporting decision-making in early-stage ventures (Li et al., 2025, pp.6-7).

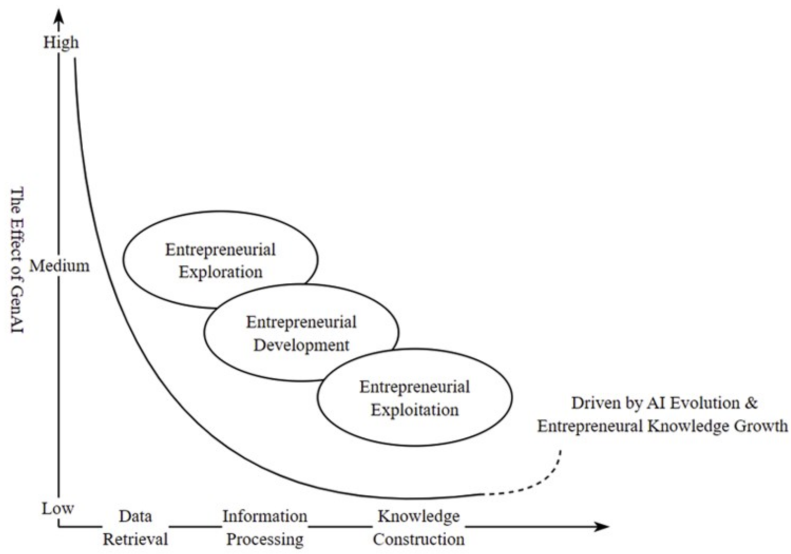

Figure 3. The effect of GenAI on different phases of entrepreneurial endeavors (Li et al., 2025).

GenAI, driven by LLM and its natural language processing (NLP) ability also plays a role in business growth and innovation. These systems augment human capabilities by producing original and creative content, thereby facilitating insight generation for business growth and supporting idea development in areas such as product innovation and the identification of customer needs (Rezazadeh et al., 2025, p.3). For marketing, GenAI enables entrepreneurs to optimise marketing processes through the automation of promotional communication and the provision of personalised customer experiences (Madhavaram & Appan, 2024). In addition, generative AI can support operational activities by automating routine tasks and assisting in decision-making processes, allowing entrepreneurs to focus on higher-value activities (Chalmers et al., 2021). For example, tools such as ChatGPT, a GenAI tool based on LLM, can extract insights and recognise patterns, enabling entrepreneurs to tailor communication strategies to specific audiences (Duong, 2025, p.2696). These applications are particularly relevant for resource-constrained entrepreneurs, as they allow access to capabilities that would otherwise require specialized skills or external support (Plecko et al., 2023).

The adoption of GenAI in entrepreneurial activities is influenced by factors identified in the broader AI adoption literature. Existing literature on AI adoption frameworks explains how users evaluate and decide to use or reject such technologies. GenAI adoption can be conceptualized as a multi-stage cognitive and behavioral process, as outlined in the Task-oriented AI Acceptance (T-AIA) model in Figure 4. This model is particularly relevant in contexts where AI is used for functional and goal-directed tasks, making it suitable for understanding GenAI use in entrepreneurial and business settings (Yang et al., 2022).

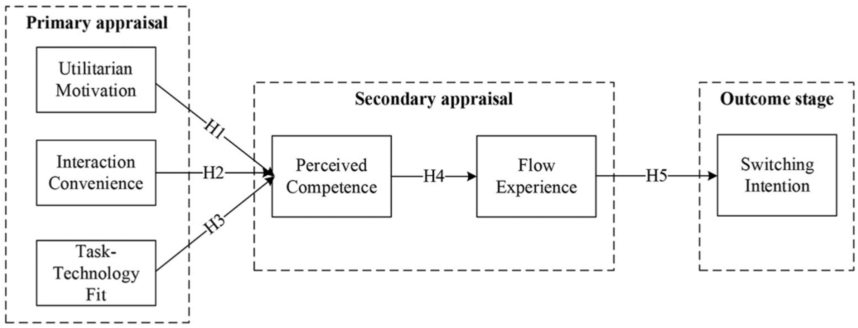

FIGURE 1
Theoretical model.

Figure 4. Task-oriented AI Acceptance (T-AIA) model (Yang et al., 2022).

The T-AIA model proposes three stages of adoption, which are primary appraisal, secondary appraisal, and outcome stage. In the primary appraisal stage, users evaluate task-oriented AI tool’s features with utilitarian motivation, focusing on the tool’s ability to support task completion and deciding on its perceived competence. (Yang et al., 2022, p.4). In the context of GenAI, this stage reflects how entrepreneurs or users assess whether tools such as ChatGPT can effectively support business-related activities. In the secondary appraisal stage, users develop a more comprehensive evaluation of the technology through further perceived competence evaluation and flow experience. Perceived competence refers to the extent to which the AI system is considered capable, efficient, and dependable, while flow experience captures how immersed and engaged the users are. Finally, in the outcome stage, these evaluations lead to behavioral intentions, and this is when users make the decision to continue using the AI system or to switch to human alternatives (Yang et al., 2022, p.5). Entrepreneurs' decisions to integrate GenAI in business activities are based on a combination of individual capabilities and external factors. Research indicates that AI adoption is driven by perceived competencies and the ability to explore and exploit entrepreneurial opportunities (Duong, 2025). This means that the entrepreneurs evaluate their digital competencies, speed of learning and learning curve of the tools before deciding which AI tools to use. An adoption factor is learning capacities, as entrepreneurs develop the skills required to interact with and apply these technologies while using them over time (D'Angelo et al., 2026, p.16). External factors such as access to support systems, regulatory conditions, and trust in AI technologies also play a role in shaping adoption patterns, particularly for small and resource-constrained ventures (OECD, 2025b).

It is crucial to acknowledge that there are limitations to AI adoption because of the risks related to technological dependency, lack of transparency and ethical concerns such as bias and inequality. The use of GenAI may create dependency on external platforms and tools, limiting entrepreneurs' control over critical business functions and exposing them to changes in platform governance or access conditions (Nzembayie & Urbano, 2026). Such dependence may limit entrepreneurial autonomy, as ventures become vulnerable to changes in pricing, access conditions, or rules imposed by platform providers. Another concern relates to the reliability of AI-generated outputs, as there is no explanation on how these systems may arrive at their results (Castelvecchi, 2016). This creates a problem for entrepreneurs, especially those in fast growing phase, who may rely on AI without fully understanding the underlying logic, leading to them making risky decisions based on biased or incomplete data. As a result, there is increasing attention in the AI field on developing "explainable AI," which aims to make AI systems more transparent and interpretable to human users. (Chalmers et al., 2021, p.1040). Furthermore, although GenAI lowers entry barriers, its effective use still depends on the entrepreneur's ability to understand and integrate these tools into business activities, which may vary significantly across individuals and contexts (OECD, 2025b). These limitations suggest that the benefits of AI adoption are not uniform and depend on how entrepreneurs engage with these technologies.

2.5 Summary of the theoretical framework

This study adopts the mixed embeddedness framework as its primary theoretical lens to explain how entrepreneurial behavior is shaped by the interaction between opportunity structures and embedded individual resources. Within this framework, digital technologies and AI are conceptualized as external enabling mechanisms through which international entrepreneurs respond to their structural and social context in the early stages of venture development.

Based on the reviewed literature of mixed embeddedness theory (Kloosterman et al., 1999), international student entrepreneurship is understood as shaped by both constraints and opportunities within the host-country environment. International students often face structural barriers, including language difficulties, limited access to local networks, and restricted access to resources. At the same time, they benefit from the social embeddedness linked to their student status at host country universities, such as access to university support, educational resources, and flexible work arrangements. These factors influence both the decision to engage in entrepreneurship and the conditions under which ventures are developed.

To examine how these conditions are managed, this study adopts an activity-based perspective of early-stage venture development, focusing on the key actions undertaken by entrepreneurs when establishing and developing their businesses (Gartner, 1985; Davidsson, 2015). This perspective allows for a structured analysis of how entrepreneurial activities are organized and conducted in practice.

Within these early-stage business activity domains, digital technologies, including AI and GenAI, are used to mediate how activities are carried out under constraints but do not determine the decision to engage in entrepreneurship. Rather than treating these technologies as independent drivers, the use of digital technologies and AI is understood as responses to institutional constraints and enabling mechanisms. These technologies enable entrepreneurs to access knowledge for venture creation, reach broader markets and manage resource constraints within their specific context of operation. The theoretical framework is illustrated by the author in Figure 5.

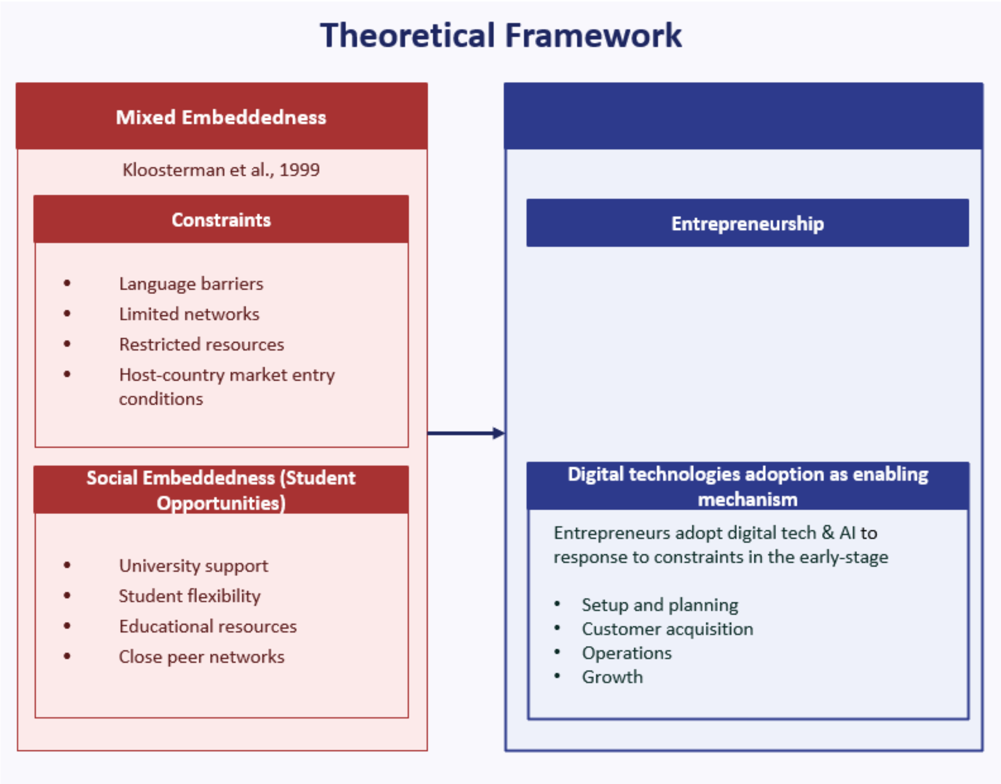

Figure 5. Mixed Embeddedness Framework of Digital Technologies Use in Early-Stage Entrepreneurship.

3 Research Methodology

3.1 Research Process

This study adopted a qualitative research design to examine how AI and digital tools are adopted and used across key early-stage business activities by international student entrepreneurs in Vaasa. A qualitative approach was considered because the research aimed to explore experiences, perceptions, and contextual factors determining adoption decisions rather than to evaluate predefined hypotheses. Qualitative research is particularly suitable for exploring complex, context-dependent phenomena where meanings and interpretations are central (Creswell & Poth, 2023). In contrast to quantitative approaches that aim for measurement and generalization, qualitative research emphasizes depth, context, and the subjective experiences of participants (Saunders et al., 2023). Rather than testing predefined hypotheses, the study focuses on exploring participants' perspectives and the contextual factors that shape their decisions regarding technology adoption.

3.2 Data Collection

The empirical data were collected through semi-structured interviews with international student entrepreneurs whose ventures are based in Vaasa and have been operating for no more than 3.5 years. Both current students and recently graduated international students were included, provided they were actively involved in managing their ventures.

A purposive sampling strategy was used to select participants who could provide relevant insights into the research topic (Patton, 2015). This approach is suitable for qualitative research where the objective is to gain a deeper understanding of a specific group rather than to achieve statistical representation (Saunders et al., 2019). Participants were required to meet three criteria: (1) international background, (2) active entrepreneurial ventures based in Vaasa, and (3) use or consideration of digital tools or AI in their business activities. These criteria ensured that the selected participants were directly relevant to the research question.

In addition, a snowball sampling technique was used to recruit further participants through referrals from existing contacts. This approach was useful in identifying additional entrepreneurs within local networks where access depends on personal and professional connections (Atkinson & Flint, 2001).

A total of five interviews were conducted. The adequacy of the sample size was assessed using the concept of information power, which suggests that the more relevant information a sample holds, the fewer participants are required (Malterud et al., 2016). In this study, the sample is considered appropriate due to the narrow research aim, the specific characteristics of the participants, and the use of an established theoretical framework to guide the analysis. All participants shared a similar background as international student entrepreneurs operating in the same local context, which increased the relevance of the data for addressing the research question. Therefore, the sample size was considered sufficient to capture meaningful patterns related to the adoption and use of AI and digital tools in early-stage business activities. Each interview lasted approximately 30 minutes and followed a semi-structured format. This format allowed the researcher to cover key themes while also giving participants the flexibility to elaborate on their experiences (DeJonckheere & Vaughn, 2019). As seen in Appendix 1, the interview guide included topics such as business formation, customer acquisition, operational activities, and the use of AI and digital tools in different phases of the business. The interview guide was deliberately structured around different activity domains of early-stage venture development to explore how the use of digital tools varies across distinct functions. All the participants were asked to describe the tools they used across different domains and the purposes for which the tools were used. These domains are not necessarily sequential, and not all ventures were active in each of them at the time of the interview.

All interviews were conducted online through Zoom, recorded with participants' consent, and transcribed with Zoom for analysis. Participants were informed about the purpose of the study and assured that their responses would remain confidential. All the transcripts were used for the purpose of the study and will be deleted upon the completion of the research.

3.3 Data Analysis

The data were analyzed using thematic analysis. Thematic analysis is widely used in qualitative research for identifying and interpreting patterns across datasets, particularly in exploratory studies (Nowell et al., 2017). Following Braun and Clarke (2006), the analytical process involved familiarization with the data, initial coding, identification of recurring patterns, and the development of broader thematic categories.

The analysis combined both inductive and deductive approaches. Initial codes were generated from the interview data, and these were later interpreted in relation to the study's theoretical framework. This allowed the analysis to remain grounded in participants' experiences while also linking the findings to existing literature.

Coding was conducted manually in Microsoft Word, with support from a digital note-organizing tool, NotebookLM, to assist in organizing and grouping codes. The tool was used solely for data organization, while all coding decisions, grouping, theme development and interpretation were done by the researcher. The initial codes were then grouped into sub-themes and subsequently into higher-order themes, reflecting broader patterns related to early-stage challenges, business activities, and the use of digital tools. The final themes were presented in a table showing the relationships between codes, sub-themes, themes, and core findings, providing a structured overview of the findings. This representation was developed directly from the coded data and used to organize the main patterns observed across the interviews. To ensure consistency, the themes were continuously reviewed and refined in relation to the original data throughout the analysis process.

The theoretical framework of the study was developed through a structured review of peer-reviewed journal articles and articles accessed via the University of Vaasa academic databases, including Academic Search Elite and Sage Journals Online. Existing literature informed both the design of the interview guide and the interpretation of findings by helping to identify relevant business activity domains and factors influencing technology adoption.

Table 3. Participant demographics

Interviewee	Student status	Years of business establishment	Type of business	Finnish/Swedish languages
A-female-Vietnamese	Graduated	4 months	Spa-beauty and wealth being	No
B-male-Vietnamese	Graduate	1 year and 11 months	F&B	Basic daily communication but cannot use Finnish for official paperwork and legal matters
C-female-Filipina	Graduate	2 years and 9 months	Digital marketing	A1 or A2 Finnish
D-female-Russian	Graduate	2 years and 9 months	Bike/scooter shop	B1 certificate and can communicate in Finnish with customers
E-female-Turkish	Student	Unknown (development stage and not yet selling)	Selling medical sketcher	Proficient enough to target Finnish companies, she struggles with the informal spoken language and regional dialects

As shown in Table 3, the interviewees are assigned alphabetical identifiers to ensure confidentiality, as some participants requested anonymity. The participants are described based on their student status, years of business operation, type of business, and level of proficiency in Finnish and/or Swedish. These characteristics were selected due to their relevance to the research focus.

Student status reflects participants' position within the host-country institutional environment, which may influence access to resources, networks, and time availability. The duration of business operation indicates the early-stage nature of the ventures, while the type of business provides context for variations in entrepreneurial activities. This is particularly relevant as the use of digital tools and AI may differ depending on business operations, with digital-based ventures typically requiring greater online presence compared to businesses with a physical location.

Finally, proficiency in Finnish and/or Swedish is included as it may influence communication with customers, access to local markets, perceived legitimacy, and integration into the local business environment. These factors are particularly relevant in the context of international entrepreneurship, where language can shape both opportunity access and constraints.

3.4 Reliability and Validity

To ensure the quality of the research, several strategies were applied to enhance reliability and validity. In qualitative research, reliability refers to the consistency and transparency of the research process, while validity concerns the credibility and trustworthiness of the findings (Saunders et al., 2019).

Reliability was addressed by maintaining a clear and structured research process, including the use of a semi-structured interview guide and systematic documentation of data collection and analysis procedures. Coding decisions and theme development were recorded to ensure transparency.

Credibility was strengthened by using verbatim interview transcripts and ensuring that findings were grounded in participants' accounts. The use of semi-structured interviews allowed participants to elaborate on their experiences, providing rich and detailed data suitable for addressing the research question. In addition, themes were continuously reviewed and compared with the original data to ensure accurate representation of participants' perspectives.

The study also acknowledges the role of the researcher in interpreting qualitative data. Reflexivity was maintained throughout the research process by critically reflecting on potential biases and how these may influence data interpretation.

Finally, the study supports transferability by providing detailed descriptions of the research context (Vaasa) and participant characteristics, allowing readers to assess the applicability of the findings to similar contexts, particularly small-city environments and international student entrepreneurship settings.

4 Empirical Results

The chapter presents empirical findings from semi-structured interviews with five Vaasa-based international entrepreneurs who are current students or recent graduates from Finnish universities. Four common themes emerged from thematic analysis, which are motivations for entrepreneurship, key challenges in early-stage entrepreneurship, use of digital technologies across early-stage activity domains and patterns of GenAI Adoption. Table 4 presents the four main themes, followed by the sub-themes, core findings of each sub-theme and an illustrative quotation as evidence.

Table 4. Summary of Core Findings with Supporting Evidence

Theme	Sub-theme	Core findings	Illustrative Quotation
Theme 1: Drivers for international student entrepreneurship	Market opportunities	Entrepreneurs identify and respond to what they consider unmet demand in the Finnish market, such as gaps in customer-focused spa services or the lack of suitable medical equipment	"When they go to massage services here, it is a bit different… it is not as attentive as in Vietnam." (A)
	Education, skills, and prior experience	Business ideas are closely linked to participants' academic background or prior expertise. Engineering students started technical businesses while business graduates started service-based firms	"We are engineers, and it somehow, we came up with this (bike shop business) naturally." (D)
	Family and social network	Family members and migrant networks provide support and resources	"My father is the main technician." (D)
Theme 2: Key challenges in early-stage entrepreneurship	Language barriers	Limited Finnish proficiency creates significant barriers in communication, such as handling phone calls or formal written interactions	"I was able to accept calls in Finnish… but that was a bit of a challenge." (D)
	Bureaucratic challenges	Issues related to business registration and taxation.	"I was not sure what type of

			business I should register." (A)
	Low business visibility	Reaching and attracting customers is a major challenge, particularly for entrepreneurs with limited marketing experience and networks	"The main challenge is advertisement… we don't understand marketing." (D)
Theme 3: Functional use of digital technologies	Business presence and legitimacy	Websites and Google Business profiles are used to establish legitimacy and professionalism	"I think having a website is necessary so that customers can find information about the business and trust that it is real." (B)
	Customer acquisition and market reach	Online platforms such as Google reviews and social media are key tools for understanding, attracting, and building trust with customers	"People trust it… they see the reviews and then they come." (D)
	Operational coordination and growth	Entrepreneurs use digital tools to manage administrative operations, including accounting, and expand their market reach	"We use Holvi, which is like a digital bank, it's all very user friendly." (D)
Theme 4: Patterns of AI adoption	Reliance on mainstream GenAI tools	Generative AI adoption is widespread, with most entrepreneurs relying on well-known tools such as ChatGPT	All the entrepreneurs interviewed said they have been using ChatGPT
	Time efficiency	AI tools are used to save time	"Because the information on the internet is a lot…, so we will ask AI to help us." (B)
	GenAI for decision-support	Generative AI tools are used as support tools for brainstorming, idea development and for understanding of business structure	"I do use AI a lot… especially with brainstorming, just making things more efficient." (C)
	GenAI for communication and	GenAI tools are practically used for writing,	"It helps a lot as well to write

	content creation	translating, and generating marketing content	descriptions… everything which needs to be translated in Finnish.” (D)
	Accessibility-driven adoption	The decision on which AI tools to use is based on accessibility, familiarity, and ease of use rather than a comparison of alternatives	“I already knew ChatGPT from my studies, so it was the first tool I started using.” (C)
	Limited depth of AI use	AI adoption remains limited at the task level due to the nature of the business, skills gaps, and time priorities	“It is a very simple way of doing business.” (E)
	Concerns	There are concerns regarding data privacy, the quality of AI outputs, and the risks of over-reliance on technology.	"I also don't want us to depend on it." (A)

4.1 Theme 1: Drivers for international student entrepreneurship

The findings reveal different drivers motivating entrepreneurs to start their businesses. The drivers can be grouped into three main factors: the identification of gaps in the Finnish market, the leverage of education, skills and prior professional expertise, social and network support. First, several participants were motivated by a specific lack of products or services that met the unique needs of the Finnish market. Participant A noticed that massage services in Finland were often strictly clinical or medical and wanted to introduce a new form of relaxation services. As they explained:

> “In Finland, massage services are mostly focused on treatment, but I wanted to offer a full relaxation experience…” (A)

Other participants also stated that they find business opportunities as there is demand in the market for their products or services:

> “there was a lack of this product (specific type of medical stretcher) in the market.” (E)
>
> “Finnish customers really like ice cream, so I chose to work with an existing brand instead of building one from scratch.” (B)

Second, all participants agreed that their educational background is important and influences what kind of business they establish. Business decisions were often aligned with participants' educational and professional backgrounds. Participant D and her father, who are engineers, started a retail shop for electric bikes and scooters, reflecting their technical background and interest. She explained:

> "we like bikes, we are engineers, and it somehow, we came up with this naturally." (D)

Similarly, some participants perceived their higher education as contributing to their business knowledge. They described how coursework and academic studies helped with understanding of the Finnish business environment and development of essential business skills. They said:

> "I also took some courses here about customer service, especially in health care." (A)
>
> "there were two groups of courses that helped me a lot: management, and finance and accounting." (B)

However, not all participants shared the view that their education is useful:

> "we didn't have any business background." (D)
>
> "university support can open the first door, but it is too limited on its own for building a B2B business." (C)

Nevertheless, participant C acknowledged that she got her first Finnish client through an event organized by the International Talents network, which was connected to the university ecosystem. Institutional conditions were not widely emphasized among participants in this study. Only one participant explicitly linked entrepreneurship to the intention of staying in Finland:

> "I chose entrepreneurship because thought about the next direction so that I could live and work here (in Finland)." (A)

Third, family and social networks are a common factor driving entrepreneurship. Three out of five participants started their business with their family members. In some cases, family members contributed directly to business operations, providing practical skills and resources. Participant A reported that her current client base is primarily Filipino and Vietnamese customers who are her acquaintances. Similarly, participant E relied on her social circle of Turkish taxi drivers to understand the pain points of the products she intended to sell to this group and potential clients abroad. One participant mentioned:

> “My father is the main technician.” (D)

4.2 Theme 2: Key challenges in early-stage entrepreneurship

The findings show that early-stage entrepreneurs face three shared challenges, including limited proficiency in local languages, bureaucratic challenges, and low business visibility.

Most of the respondents noted that the lack of Finnish language proficiency has caused some challenges. Three out of five participants reported that they have limited proficiency in the local languages, Finnish and Swedish. They positioned themselves at A1 to A2 level, which are beginner levels, according to the standardized language proficiency system Common European Framework of Reference for Languages (CEFR). As a result, they primarily used English for administrative tasks and customer communications, with customers consisting of both locals and foreigners. Despite these limitations, participants expressed effort in learning and improving their language skills to better engage with customers. For the nature of their work in the service and F&B businesses, entrepreneurs B said that this level of language is enough to service customers whereas A said she works with English speaking clients more. Some participants stated although they are speaking sufficient Finnish at a B2 CEFR level, the informal dialects used in daily business and formal communications through phone calls and emails are still challenging. Participant D said:

> “I was able to accept calls in Finnish… but that was a bit of a challenge.” (D)

The second common challenge is bureaucracy and regulations. Participant D expressed problems related to taxation while A was not sure about the type of business she should register for. One of the participants said:

> “I was not sure what type of business I should register.” (A)

However, not all participants expressed regulatory challenges, indicating that there are variations in experiences. Another recurring pattern is that all the participants sought consultations from VASEK, the regional business and development company, on how to start and register for their business. Participant D specifically relied on VASEK in 2022 to navigate the complex paperwork of registering a limited company as a newcomer to the country while participant A also consulted the organization before her business launch. Participant A noted that there is no one checking how her business is doing and suggested that VASEK should track how the businesses are doing.

For the third challenge, some participants mentioned the low business visibility in the markets. The participants described visibility as a struggle to reach the right audience and a lack of established networks. Participant C, who is running a digital marketing agency, said that she did not have a network when starting her business and had to start looking for clients through in-person networking events. She explained:

> "I didn't have that (connections), like I was starting from scratch." (C)
> "I don't know anyone in the business community here in Vasa, more so in Finland." (C)

Another participant D stated that a lack of marketing knowledge made it difficult to increase the visibility of their bike shop to customers:

> "I think the main focus should be and the challenge. It's like advertisement... we don't understand how it works."(D)

4.3 Theme 3: Functional use of digital technologies

The findings suggest that international student entrepreneurs primarily use digital technologies to respond to constraints. The common themes of the findings on how the participants use digital technologies are characterized by a reliance on technology to establish professional legitimacy, using technologies for customer reach and acquisition and for operational coordination. While the specific toolkits vary by industry, common patterns emerge across the activities domains of setup and planning, customer acquisition, operations, and growth.

4.3.1 Digital technologies to establish business presence and legitimacy

All participants emphasized having an online presence to signal professionalism and establish local legitimacy. The entrepreneurs explain that it is important that they establish legitimacy to customers, especially Finnish customers, by having a website and Google Business Profile:

> "Just we have website to let people know that we are, like legit." (E)
> "That's a huge thing in Finland. If you want to be treated as a professional entrepreneur, the first thing that they will ask you, is, what's your website?" (C)

Some entrepreneurs choose not to build a website but opt to use a Facebook page as their primary digital profile. One participant said:

> "No, I don't have a website, I only use a page on Facebook." (B)

Similarly, another participant gave an explanation as such:

> "…I don't have many products to use a website, so I invested and focused on Facebook"(A)

Participants used different digital website-building platforms such as Wix, WordPress, Odoo, and Tilda to support website development and in some cases, broader business operations. The choice of platform depends on how user-friendly it is. While WordPress is the standard, some choose Wix for its user-friendly interface, or Tilda for its lower initial costs. For branding, specialized design software like Adobe Photoshop and Canva were used to create logos, marketing visuals for social media and visual identities.

4.3.2 Digital technologies for customer acquisition and market reach

Participants reported using a combination of search-based platforms, social media platforms, and networking strategies to acquire customers and expand market reach and growth. Nearly all the participants emphasized that it is important to have Google Business Profile and customer reviews as channels for being discovered by both local and international customers. One participant explained how these profiles can attract international customers through internet search:

> "…especially foreigners? They go straight to Google, they Google, they see reviews, and they come there. (D)

Most of the participants also reported using Facebook for customer outreach. This included maintaining business pages, participating in targeted groups and forums, and running paid advertisements. One participant talked about joining targeted Facebook with their potential clients to understand the needs:

> "We have created the business profile in Facebook and then joined taxi forums…talking and then asking questions." (E)

Differences were observed between participants operating in Business-to-Business (B2B) and Business-to-Consumer (B2C) contexts. Participants in B2B businesses reported relying on LinkedIn and Finder.fi to identify and contact potential clients:

> "if you're a B2B, like I am, of course there's LinkedIn if you're dealing with fellow businesses, definitely LinkedIn." (C)

In contrast, the participants working in Business to Consumer (B2C) sector relied on foot traffic and Google searches based on their physical locations. Additionally, one participant reported leveraging their internal university networks to gain first clients and using Instagram for networking and visual marketing. All participants reported using design tools such as Canva to create marketing materials, including posters and social media content.

4.3.3 Digital technologies in operational coordination and growth

For the domain of operational activities, some of the entrepreneurs reported using specialized digital tools and platforms to automate administration tasks and increase operational efficiency. Some specific digital banking and accounting tools such as Holvi or Klepia are mentioned to help handle Finnish taxes. The participants stated:

> "we use Holvi, which is like digital bank, it’s all very user friendly.” (D)
> "...I use that accounting app Klepia... every month it will make a report for me and it automatically applies to the tax office." (A)

Some participants noted that they were using more digital technologies to improve visibility and expansion. One participant shared about opening an online shop beside having a physical store:

> “when we started with the online shop, we were using Google Merchant Center” (D)

Some participants also mentioned using AI to create marketing content to expand their market reach, particularly into the native Finnish demographic.

4.4 Theme 4: Patterns of AI adoption

The findings show that entrepreneurs demonstrate several common patterns in their use of AI, including reliance on mainstream GenAI tools such as ChatGPT, the use of AI for decision-support and content creation, adoption driven by accessibility and familiarity, and a generally limited depth of AI use.

Although all the participants reported using AI tools, the tool they mentioned the most often was ChatGPT and in some cases Claude AI, DeepSeek and Lovable, which belong to the same category of GenAI tools. Other types of AI applications were not mentioned in the interviews. One of the participants said:

> "I do use AI a lot, chat, GPT, Claude, Gemini... in terms of especially with brainstorming, just making things more efficient." (C)

All participants said they use AI tools so that they can save time, either from traditional research and administrative setup, or from their own business tasks. One participant stated:

> “Because the information on the internet is a lot,... so we will ask AI to help us.” (B)

Similarly, one participant used AI to support her with coding tasks and mention different tools which are within the same GenAI category. She shared :

> "I'm coding a website, for example. It (AI) helps with the code, makes it faster. I could do more for my clients." (D)

A recurring pattern of AI adoption is the use of AI for research and decision-support. Several participants described using AI as a starting point to navigate Finnish business registration processes and understand legal structures before seeking face-to-face consultations with advisory services. Common uses include generating business and marketing ideas, comparing company structures (e.g., private trader and a limited company), and locating relevant registration information. One participant shared:

> "before I go to consult from a consulting company, I also started researching for myself first using AI (ChatGPT) to find out what procedures I needed." (A)

Participant D reported that she used ChatGPT as tax advisor and found it disappointing that the tool's new update can no longer give advice on this legal matter.

Another sub-theme is the use of AI tools for some form of communication and for content creation, as mentioned by all participants. These tools were used to draft social media captions, prepare email marketing content, and generate technical product descriptions. One participant shared:

> "We use it through, for example, yes, translation for the post, write, creating brochures and manuals. Brochures and visual documents." (E)

Most of the participants also used AI for writing and translation-related tasks, such as writing professional emails to communicate with clients and authorities. An example was:

> "we don't really speak Finnish very well, we're using this (AI) to answer our clients in Finnish" and when we reply to emails as it contains technical details…" (D)

Some participants mentioned using AI as a marketing and growth strategy because translating marketing materials into Finnish can help to attract more local clients and manage increasing workloads without hiring more staffs. One participant stated:

> "using advertisements in Finnish to connect with Finnish people more... if the advertisement for the service is in Finnish, it will attract them more." (A)

Most of the participants said that they select which AI tools to use based on familiarity and prior exposure, stating that ChatGPT was the most well-known tool. One participant mentioned that he mainly used ChatGPT and lacks information on specialized AI:

> "I don't know much about specific AI tools. ChatGPT is one that is quite popular, other AI tools... I also want to use but don't know yet." (B)

Similarly, another participant stated that she lacked an understanding of different AI tools and made the choice of a specific platform based on network's recommendations. She said:

> "I didn't have a concept of which application to use for everything... because I trust my friends who have used it (ChatGPT) and I follow." (A)

Several participants reported selecting AI tools based on the sufficiency of free versions. One participant noted that the free version of AI tools was enough as of this stage and therefore did not explore paid alternatives or more advanced features. She said:

> "currently it is meeting my needs so I am not paying extra fees." (A)

The findings showed limited depth of AI usage due to varied reasons. Although all participants said that AI is useful, most of them reported using AI tools primarily for their current business needs and task-based activities. Some participants mentioned that because they are in the very early stages or have not yet started selling, they cannot yet focus on growth AI tools. One participant noted that she did not see a need for advanced tools or AI yet:

> "very simple way of doing business." (E)

Similarly, one participant who is in the F&B business observes that his daily work is largely manual and did not see a routine use for AI in his current operations:

> "for my daily business work, I don't have to use AI much because it's not creative work anymore. This is a job that's quite manual" (B)

Some entrepreneurs also identified the lack of knowledge and time to master new AI tools. One participant mentioned wanting to use AI for video generation, but did not do so:

> "doesn't know how to do it yet and haven't had the time to do it" (B)

Regarding the risks of using AI, the participants raised similar concerns regarding data privacy, the quality of digital outputs, and the risks of over-reliance on technology. Regarding privacy, there is a strategic caution toward feeding sensitive information into AI systems. One participant mentioned :

> “for the privacy section, I try not to feed in, like, specific names or try to avoid giving business names.” (E)

While all of the entrepreneurs used GenAI for translation task, some questioned the accuracy of AI-generated content without human verification, especially with Finnish translations. Finally, there is a strong desire to avoid over-reliance or total dependency on digital tools, with participants emphasizing that AI should remain a reference source rather than a replacement for human knowledge and experience. One participant stated :

> "I also don't want us to depend on it... I still have to use my knowledge, experience, and other sources of information to complete my plan." (A)

5 Discussion and Conclusion

This study focused on the experiences of international student entrepreneurs in Finland through the lens of mixed embeddedness framework, while considering that they acquire human capital and have more advantages of being a student in the university ecosystem. The study also highlighted digital entrepreneurship and AI as an external enabler. The findings reveal a more complex interaction between these theoretical perspectives than initially assumed.

5.1 Mixed-embeddedness and international student entrepreneurship

From the perspective of mixed embeddedness (Kloosterman et al., 1999), entrepreneurship among migrants is shaped by the interaction between individual resources, such as personal interest and family ties, and institutional conditions such as regulations and labor market exclusion. The findings are consistent with the role of social embeddedness in forming early-stage entrepreneurial activities such as resource mobilization. In the findings, most of the international student entrepreneurs rely on close family ties during venture creation by running the business with a family member, reflecting strong social embeddedness in the early stages. While social embeddedness within immigrant communities supports initial venture creation, the findings illustrate a partial contrast to Kloosterman et al. (1999) regarding the choice of business segment in the urban economies.

The literature emphasizes the association between migrant entrepreneurs with limited financial and human capital and entry into small-scale, labor-intensive, and low-skill urban sectors such as retail, wholesale and restaurants (Kloosterman et al., 1999, p.262). In this study, while some ventures do share such characteristics by operating in food and beverage (F&B) and service-based businesses, the overall pattern is more heterogeneous with other participants running a digital marketing agency or a trading business. Moreover, four out of five participants had completed a master’s degree at a Finnish university, suggesting that the choice of business sector is not due to lack of human capital. In addition, instead of positioning themselves at the lower end of the opportunity structure and providing group-specific products or business restaurants (Kloosterman et al., 1999, p.263), all the entrepreneurs in the study aim to scale and extend their activities beyond these international networks to access broader local market opportunities. This is shown in the choice of the participant selling a well-known Swedish ice-scream brand or running a bike shop given the strong bike infrastructure in Vaasa and Finland overall. Overcoming language-related constraints becomes critical goals for all entrepreneurs. Some participants highlighted the potential role of AI in bridging this gap, enabling them to communicate more effectively and expand their reach into the native local market. The findings extend prior research on migrant entrepreneurship, which emphasizes reliance on co-ethnic networks, by showing a shift towards deeper integration into the host country business environment among international student entrepreneurs.

In this study, institutional constraints are reflected in language barriers and initial unfamiliarity with the local business environment. Although some participants did not explicitly state that language barriers directly influenced their business choices, the patterns in their types of business and client base suggest that their entrepreneurial activities were still shaped by institutional constraints. Language barriers function as an informal institutional constraint within the opportunity structure, influencing not only market access but also the entrepreneur's ability to establish legitimacy and build relationships in the local context. For example, since several participants did not speak Finnish fluently, they specifically targeted English-speaking clients or operated in sectors where communication demands are more manageable, such as F&B or beauty services. From the economic embeddedness perspective, the entrepreneurs' success in venture creation is tied to their ability to identify and exploit specific gaps in the Finnish economic structure. This indicates that entrepreneurs adapt their business strategies in response to the institutional conditions, reflecting the dynamics described in mixed embeddedness. For institutional embeddedness, the labor market and language requirements in Finland serve as both a barrier and a reason for entering entrepreneurship. Overall, these findings are consistent with the theoretical expectation that migrant entrepreneurs operate within structurally embedded environments.

The empirical findings also show some differences in the role of labor market exclusion as a key driver of migrant entrepreneurship. None of the participants described barriers to formal employment as the primary motivation for entering entrepreneurship when asked about why they started their businesses. Instead, the findings suggest that venture creation was more strongly associated with opportunity identification and the embedded resources available to them, including family involvement, skills acquired through higher education and access to English-speaking customer segments. However, this does not imply that other structural constraints are absent. In the Finnish context, residence permit rule is another type of structural constraint. International graduates are subjected to a time-limited residence permit, requiring them to secure employment within a defined period or leave the country. This policy may create structural pressure to establish alternative career pathways, in this case entrepreneurship as a career path. The empirical findings show that some participants initiated their ventures during their studies or immediately after graduation, suggesting a more proactive approach to employment, supported by access to university resources and existing networks. In general, these findings suggest that, in contrast to prior studies that emphasize lab our market exclusion as a key driver of migrant entrepreneurship, labor market exclusion plays a less significant role for international student entrepreneurship.

5.2 Human Capital and University Ecosystems

The empirical findings highlight the importance of human capital in shaping entrepreneurial trajectories. Participants frequently emphasized the role of education, skills, and prior experience in enabling them to identify and exploit business opportunities. This aligns with the arguments of Ferrante et al. (2019), who suggest that human capital enhances entrepreneurial capacity by improving individuals’ ability to recognize and act upon opportunities. In this study, student entrepreneurs acquire their human capital, which are the cognitive abilities and non-cognitive traits that allow them to identify and leverage business opportunities to create economic value through their university education. Universities contributed not only to the acquisition of business-related knowledge, such as management, finance, and customer service, but also to a broader understanding of how the Finnish business environment operates.

The findings are supported by literature on the characteristics of international student entrepreneurs facing structural barriers but benefiting from being in the university ecosystem. The university ecosystem in Vaasa acts as a supporting push factor for international student entrepreneurs, providing a blend of technical expertise, business validation, and institutional support. In line with Passavanti et al. (2023), universities provided initial access to networks, knowledge, and institutional familiarity. However, the empirical findings indicate that such support was often insufficient for entrepreneurial development, particularly in B2B contexts. Higher education institutions serve as a critical starting point by equipping students with the human capital and technical skills necessary to navigate the Finnish business environment. The university also provides a safe and low-risk environment for idea validation and testing. However, findings from participants noted that university-based networks were limited in scope and that accessing real clients and business opportunities required engagement beyond the university ecosystem. Despite these benefits, the university can become a bubble where networks are limited to professors and fellow students, requiring that students need to look beyond the academic network to achieve true integration. This suggests that universities function primarily as entry points rather than comprehensive support systems for international student entrepreneurs.

Overall, these findings confirm previous research that identifies universities as important sources of entrepreneurial human capital and initial support. However, the findings are only partly consistent with previous research suggesting that student ventures can support the transfer of academic knowledge into practical market applications. In this study, such knowledge transfer was present in the way participants applied knowledge gained through their studies and used university-based networks for early customer outreach.

They did not pursue formal commercialization of academic research or technology. For international student entrepreneurs, university ecosystems therefore mainly provide an entry point into entrepreneurship, but their role becomes more limited when entrepreneurs move toward customer acquisition and venture growth.

5.3 Digital entrepreneurship and AI

This study distinguishes between the role of general digital technologies and the more recent emergence of GenAI in entrepreneurship. While both fall under the broader umbrella of digital entrepreneurship, the findings indicate that they perform distinct functions in venture creation. The main purposes and types of digital technologies and AI tools used in different activity domains are presented in Table 5. The table's organization reflects the activity-based perspective of the theoretical framework, showing how digital technologies and AI are used across different entrepreneurial activities.

Table 5. Digital toolkit for early-stage business activities (by activity domains).

Activity domain	Digital technologies used	AI / GenAI tools used	Main purpose
Setup and planning	Websites, Facebook pages, Google Business Profile, Wix, WordPress, Odoo, Tilda	ChatGPT, Claude, DeepSeek	Business planning, registration support, legitimacy building
Customer acquisition	Google Business Profile, Google Reviews, Facebook groups, Instagram, LinkedIn, Finder.fi, Canva	ChatGPT for marketing visuals generation and translation and communication tasks	Visibility, trust-building, branding and customer outreach
Daily operations	Holvi, Klepia (banking and accounting tools), Facebook page for communication	ChatGPT for content generation (writing, translation, coding)	Administrative efficiency and communication
Growth	Online shop, Google Merchant Center, social media ads, LinkedIn	GenAI for brainstorming of growth ideas	Broader business reach, idea development

5.3.1 Digital technologies in entrepreneurial activities

The findings demonstrate that digital technologies are integrated in the foundational activities of early-stage ventures for the advantages they bring. Drawing on Nambisan (2017), digital technologies consist of layered digital artifacts, platforms, and infrastructures. As seen in Table 5, the findings provide empirical support for this perspective as participants consistently reported the use of websites, social media platforms, digital payment systems, and online business tools to establish legitimacy, reach customers, and manage operations. The findings show that entrepreneurs use Canva as a digital artifact for digital content generation that facilitates market engagement, rather than being the acquisition channel itself. Facebook is both a digital platform and acts as a community hub. This suggests that entrepreneurs do not rely on isolated tools but organize their activities through a combination of digital artifacts, platforms, and infrastructures. While the specific toolkits vary by industry, common patterns emerge across the activities domains of setup and planning, customer acquisition, operations and growth. These findings also align with Plecko et al. (2023), who argue that digitalization supports cost saving, operational efficiency, and access to wider markets. This confirms prior literature that digital technologies enhance efficiency and market access.

However, the findings extend this literature by showing that, in the context of international student entrepreneurship, digital tools also compensate for limited local embeddedness. In this study, digital technologies appear to serve both opportunity-driven and necessity-driven purposes. They enable entrepreneurs to increase visibility and customer interaction, while simultaneously compensating for constraints related to limited local networks. In this sense, digital tools function as practical mechanisms that allow international entrepreneurs to participate in the market despite limited resources. In relation to Lamine et al. (2023), the findings indicate that digital technologies contribute to greater flexibility in entrepreneurial activities by reducing constraints associated with traditional boundaries of time and location. Participants were able to communicate with customers, maintain business presence, and coordinate certain activities through digital means. Therefore, the contribution of this finding is not that digital technologies transform all early-stage ventures, but that they provide foundational infrastructure for legitimacy, visibility, communication, and operational coordination. For physical and service-based businesses in particular, digital technologies support and extend existing activities rather than fundamentally reshaping the underlying business model.

5.3.2 GenAI as a task-oriented enabler

The findings partially support prior research by Chalmers et al. (2021), which conceptualizes AI as an external enabler in entrepreneurship, but they contrast with expectations regarding its strategic and transformative business potential. The findings suggest that entrepreneurs perceive AI tools as practical solutions to improve efficiency and boost productivity. Empirical findings demonstrated that AI tools were used to reduce uncertainty and lower entry barriers by supporting tasks such as research, drafting, translation, and idea generation. In doing so, they helped compensate for constraints associated with operating in a foreign environment, particularly those related to language and limited local knowledge. One growth tactic involves using AI to translate existing English materials into professional Finnish to appeal to a wider audience.

Most participants used AI tools in supportive ways, with one exception: the participant running an online digital marketing business demonstrated deeper technological integration. The findings also indicate that while all entrepreneurs interviewed said they have used AI tools, their usage remains non-strategic. Most participants rely on a single, well-known GenAI model such as ChatGPT, often due to the tool’s popularity. The adoption pattern observed among the participants can be partially interpreted through the T-AIA model (Yang et al., 2022). The findings reflect a task-oriented logic of AI acceptance, in which entrepreneurs evaluate AI tools mainly based on their usefulness for completing immediate business tasks, for example social media post generation. The findings support the primary appraisal stage of the model, as participants used AI tools when they perceived the tools as helpful for specific activities. The findings also show that most entrepreneurs select AI tools based on exposure during their university studies. The factors influencing the adoption of AI tools among the participants are immediate accessibility, personal familiarity, and social proof. The findings do not indicate that the participants carried out a systematic research process to identify the most suitable available technology before choosing to adopt a tool. The findings expand previous literature by suggesting that adoption is shaped by factors beyond the model, including university exposure, social visibility, and familiarity with specific tools.

Time constraints were frequently mentioned as a reason for not exploring more advanced functionalities or alternative solutions. Some participants highlighted a lack of knowledge on how to effectively utilize AI tools, indicating that while access to technology is not a major barrier, the capability to fully leverage it remains limited. This reflects that entrepreneurs prioritize using AI for current daily operational needs over exploring new tools. Overall, the findings suggest that AI adoption remains limited at a task-based level rather than being integrated into core business processes. Within the theoretical framework, this indicates that for international entrepreneurs, AI functions as a task-level enabling mechanism used in business activities rather than being structurally integrated into the business model. Ultimately, for these entrepreneurs, the tool selection is driven by familiarity and ease of integration into existing workflows to solve problems instead of a strategic evaluation process of the tools' technological capabilities. This provides a more cautious view of GenAI adoption in entrepreneurship by showing that accessibility does not automatically lead to strategic or advanced use.

Overall, the findings contribute three main insights to previous literature. First, international student entrepreneurs represent a distinct subgroup of migrant entrepreneurs because they combine migrant-related constraints with student-related resources. Second, digital technologies function as infrastructure for legitimacy, visibility, customer access, and operational coordination. Third, GenAI adoption is widespread but shallow, as international entrepreneurs mainly use familiar tools for task-level support instead of integrating AI strategically into business models or decision-making processes.

5.4 Practical Implications

For the international student entrepreneurs and future international entrepreneurs operating in foreign market environments, the findings of this study highlight the practical roles of digital tools, particularly GenAI, across early-stage business activities and for specific tasks. The results suggest that GenAI tools such as ChatGPT and Claude AI are used to support research, communication and content creation. These GenAI tools support the exploration and development phase by enabling large information retrieval and processing, thus expanding the access to market information, regulatory requirements, and business knowledge. In this sense, GenAI tools can function as cost-effective and accessible support assistants that complement, rather than replace traditional advisory services. In addition, for entrepreneurs facing language barriers, the findings indicate that GenAI tools can play a key role in mitigating language barriers. Their use in translation and professional writing improves the quality and clarity of communication with local stakeholders, including customers, partners, and authorities. This contributes to perceived business legitimacy and facilitates entry into the local market. Furthermore, GenAI tools can be used in marketing-related activities, such as content creation and customer communication, suggesting that even basic use of GenAI tools can support customer acquisition and early-stage growth.

For the supporting organisations and universities, the study reveals a need for more targeted support, training, and workshops to increase awareness of different AI tools and help international entrepreneurs utilize advanced digital technologies. University-affiliated partnerships are still important for networking. To bridge the gap between academic theory and reality, other ecosystem stakeholders such as VASEK and Vaasa Startup Factory can facilitate digital technology adoption by providing practical guidance on the use of AI tools. Rather than focusing only on general digital skills, training programs could emphasize applied use cases on AI tools integration within specific entrepreneurial activities, such as marketing, customer interaction, and operational management. Increasing awareness of available functionalities of different AI tools may improve the effectiveness of technology use and strengthen overall regional business development.

For the technology developers and technology companies, the study highlights the importance of accessibility in shaping technology adoption in early-stage entrepreneurship. In this study, early-stage international entrepreneurs rely on tools that are affordable, easy to use and widely available. This suggests that usability, onboarding support with learning materials and clear guidance on practical applications are critical factors influencing adoption. Tools that have fast learning process, less complex while provide immediate value are more likely to be integrated into daily business activities, particularly in resource-constrained environments.

5.5 Study limitations and areas of future research

This study is subject to several limitations that should be considered when interpreting the findings. First, the research is based on a small, purposively selected sample of five international student entrepreneurs in Vaasa. While this context provides valuable insights into the underexplored group and small-city ecosystems, the findings are context-specific and may not be directly transferable to larger metropolitan environments with different institutional conditions and resource availability.

Second, qualitative design relies on self-reported data from semi-structured interviews, which may be influenced by subjective interpretations of the author and recall bias. Third, the cross-sectional nature of the study captures digital tool adoption at a single point in time and does not account for how the use of digital technologies and GenAI may evolve as ventures develop.

Future research could build on this study by expanding the sample size across multiple small-city contexts to enhance the robustness and transferability of the findings. Comparative studies between different small-city ecosystems would provide deeper insight into how contextual conditions, such as limited market size, language barriers, and the central role of the university ecosystem, shape entrepreneurial activities. Additionally, longitudinal approaches would be valuable in capturing how the adoption of digital technologies and GenAI evolves over time and influences venture development beyond the early stages.

In conclusion, the findings answer the main research question by showing that digital technologies are adopted and used broadly across early-stage business activities, while more advanced AI technologies are adopted and used more narrowly for task-oriented support. Notwithstanding its limitations, this study suggests that international student entrepreneurs use these technologies as practical enabling mechanisms within the structural conditions of early-stage entrepreneurship. The findings are consistent with previous literature on mixed embeddedness and digital entrepreneurship, but they also add nuance to the literature by showing how international student entrepreneurs, as highly educated migrants, combine university-based human capital, social networks, and accessible digital technologies to mediate constraints related to language, visibility, and institutional unfamiliarity. The study therefore contributes by showing that while digital artifacts, digital platforms, and digital infrastructure are embedded in everyday entrepreneurial activities, the adoption and use of more advanced GenAI technologies are not yet strategic or transformative but remain accessibility driven.

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Appendices

Appendix 1. Interview Questions for entrepreneurs

Thesis Topic: AI and Digital Tools Adoption in Early-Stage International Student Entrepreneurship in Vaasa

Business Background

1. Where are you from, what is your academic background, how long have you been in Finland?
2. Can you briefly describe your business and when you started it?
3. How did you come up with your business idea?
4. What is your level of Finnish or Swedish?
5. How does the language level impact your business ventures?

Early-Stage Experience

6. What was the biggest challenge you faced when starting your business in Vaasa?
7. Does having an education in Finland help and how?

Digital Tools Across Early-Stage Activities

8. What digital tools and/or AI did you use during the setup phase of your business, and for what specific tasks?

Stage 1: Setup and planning

Which tools did you use during setup and early planning?

Stage 2: Customer acquisition

Which tools have been most important for attracting customers?

Stage 3: Daily operations

Which tools do you use to run the business day to day?

Stage 4: Growth

Which tools help you improve or grow the business month to month?

AI Adoption and Benefits

8. What have been the main benefits and limitations of using AI tools? (If you have not used AI, what are the main reasons you have not used AI tools?)
9. What is your future plan as an entrepreneur and the contribution of digital tools and AI in that?