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Exploring the Integration of Artificial Intelligence in the Ideation Stage of Product Development in Swedish Startups: Challenges, Opportunities, and Tool Utilization

by

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Abstract

The integration of Artificial Intelligence (AI) within product development has emerged as a significant area of research, especially in 2022-2023. However, there is a lack of empirical research on how AI tools are integrated into the product development process, especially within the ideation stage of startups, and what challenges and opportunities arise from this integration. Our thesis explores the following research question: **What are the opportunities and challenges of implementing AI tools for product development in Swedish startups?** We conducted semi-structured interviews with eight Swedish startups, supported by an analysis of information readily available online. Firstly, our findings demonstrate the challenges that arise from the integration of AI tools within the ideation stage of the product development process, which include: (1) Limited context awareness (2) Limited technical and professional skills from users (3) Data Limitations (4) High cost (5) Over Reliance on AI and (6) Ethical concerns. Secondly, our findings demonstrate the opportunities that arise from the integration of AI tools within the ideation stage of the product development process, which includes: (1) Increasing efficiency, (2) Knowledge acquisition, (3) Enhancing user experience, (4) Cost efficiency, and (5) Innovation. Finally, our findings demonstrate which AI tools are currently being utilized, which includes the exploration of: (1) Language Models ChatGPT (2) Language Models Github Copilot (3) Data Generators (4) Automatic Speech Recognition (5) Natural Language Understanding (6) Modeling Tools.

Keywords: Artificial Intelligence; Product Development; Ideation Stage; AI Tools; Startups

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1. Introduction

In recent years, specifically looking at 2022-2023, the development and integration of artificial intelligence (AI) tools in various industries have revolutionized the way businesses operate (Maslej, Fattorini, Brynjolfsson, Etchemendy, Ligett, Lyons, Manyika, Ngo, Niebles, Parli, Shoham, Wald, Clark & Perrault, 2023). The implementation of AI in product development has gained significant attention, as it has the potential to streamline and enhance the product development process, resulting in improved product quality and reduced costs (Zhang, Zhang & Song, 2021). Sweden is among the countries at the forefront of this technological revolution, with 50% of Swedish companies reporting they were in the “advanced” stages of AI maturity, well above the European aggregate of 32% (Business Sweden, 2022). This study aims to explore the ways in which AI tools are currently being utilized for product development within the ideation stage in Swedish startups. By delving into this topic, the study seeks to provide insights into the current state of AI implementation in product development in the Swedish startup ecosystem, and its potential impact on the industry's future.

Therefore, our main research question is:

What are the opportunities and challenges of implementing AI tools for product development in Swedish startups?

In addition, to reinforce the main research question and explore other aspects of the implementation, one more research inquiry will be posed, namely:

In what ways are AI tools presently utilized for product development in Swedish startups?

Product development is a crucial aspect of the success of startups (Harmsen, Grunert & Boye, 2000). The process of developing a product involves a range of activities, including ideation, market research, prototyping, testing, and launching (Harmsen, Grunert & Boye, 2000). In this research paper, the ideation stage will be the focus because it lays the foundation for the rest of the product development process. The success of the finished product can be strongly impacted by the caliber and number of ideas created during ideation. As a startup grows, product development becomes increasingly complex and challenging, requiring a systematic and iterative approach that balances speed, quality, and innovation.

In product development, Design Thinking (DT) is an important methodology to help firms better understand their customers' needs and pain points and develop products and services that address those needs. DT is an iterative, human-centered problem-solving approach that emphasizes empathy, creativity, and experimentation (Razzouk & Shute, 2012). It is widely used in the business world as a tool for innovation and customer-centricity (IDEO, 2021) to improve their overall business strategies.

The rapid advancement of Artificial Intelligence (AI) technologies has led to significant changes in the business landscape, creating new opportunities and challenges for startups. It is altering how people work, communicate, and interact with one another, and its impact can be felt worldwide (Maslej, Fattorini, Brynjolfsson, Etchemendy, Ligett, Lyons, Manyika, Ngo, Niebles, Parli, Shoham, Wald, Clark & Perrault, 2023).

According to Hassani, Silva, Unger, TajMazinani & Mac Feely (2020), AI can be defined as “a computer system that reproduces human cognition using data which is accessed from a variety of different sources/systems to take decisions and learn from the resulting patterns” (p.145). In other words, AI involves the development of intelligent machines that can learn, reason, and make decisions based on data.

In the workforce, AI is improving the quality of decision-making, and enhancing productivity by automating routine tasks (Brynjolfsson & Mitchell, 2017). However, it is not only routine tasks that AI is capable of, more recently, AI is being adopted by organizations to innovate (Mariani, Machado, Magrelli & Dwivedi, 2022). Innovation, once considered to be a non-replicable human task, is now being tested by the advancements of AI.

While there has been extensive research on product development and AI individually on how AI can help companies improve their overall efficiency and enhance creativity, there is still a significant gap in understanding how AI tools are integrated into the product development process, within the ideation stage, particularly in the context of innovative startups. Thus, there is a need for focused research to bridge the gap and provide valuable insights into the integrations of AI tools and how challenges and opportunities arise from this integration.

The purpose of this study is to investigate the current utilization of AI tools in product development within Swedish startups. This study aims to provide insights into the potential benefits and challenges associated with these tools. Ultimately, the findings of this study will inform future decisions around the implementation of AI tools in product development within startups during the ideation stage, as well as contribute to the broader discussion around the role of AI in innovation and entrepreneurship in Sweden.

We are focusing on Sweden due to its highly innovative environment. In the 2022 Global Innovation Index, Sweden is ranked third and is cited as having strong performances in indicators such as innovation output, knowledge and technology outputs, and creative outputs (Global Innovation Index, 2022). The findings could also be used to develop best practices and guidelines for integrating product development and AI in startups, which could be applicable to startups and industries outside of Sweden.

The significance of this study stems from the fact that the integration of AI tools within the ideation stage of product development can result in more innovative and effective solutions. This study adds to the literature on the intersection of product development, specifically looking at ideation and AI, which has received limited empirical research. Currently, there is research that delves into the impact of AI on DT practices (Cockburn, Henderson & Stern, 2018; Verganti, Vendramelli & Iansiti, 2020; Haefner, Wincent, Parida & Gassmann, 2021), while we focus on one stage of DT: “ideation”. The study provides valuable insights into how the ideation stage within product development and AI can be effectively integrated into a specific cultural and business context by exploring the specific context of Swedish startups.

Furthermore, this study can provide valuable insights for startups to make informed decisions about how to leverage AI technology to improve their products and services, optimize their operations, and ultimately increase their chances of success in the marketplace by leveraging AI tools. Simultaneously, by incorporating AI in the operation process, startups can potentially automate some of the product development tasks and focus on the more pressing tasks at hand, ultimately giving them a competitive advantage in the market.

The findings of this study can be utilized by product managers and innovation managers of Swedish startups who aim to create efficient strategies for addressing challenges and capitalizing

on opportunities in the AI era. The study aims to offer an in-depth understanding of the integration of AI tools into the product development phase of startups in Sweden, ultimately contributing to the creation of best practices for product development professionals. This paper can act as a resource for practitioners seeking to incorporate AI into their product development processes and help them overcome potential obstacles while taking advantage of the many opportunities offered by AI technology.

The paper is structured as follows: chapter two begins with a review of relevant literature to evaluate the existing knowledge and understanding of the topic of product development, design thinking, artificial intelligence and AI integration in innovative businesses. In chapter three, the research methodology will be elaborated upon in detail. In chapter four, the findings will be revealed, followed by chapter five, the discussion of the findings. This report's research approach will involve conducting semi-structured interviews with product development teams in Sweden, utilizing their insights to enhance the study's comprehensiveness and depth of understanding. We conclude with recommendations for integrating these findings into Sweden's startup operations.

2. Theoretical framework

2.1 Introduction to Product Development

Product development is a complex process that involves the conceptualization, design, testing, and commercialization of new products or services, or the improvement of existing products or services (Rogers, Lambert & Knemeyer, 2004). Due to the growing importance of innovation for organizational success and for competitive advantage, product development is seen as an important factor for success (Sajid, Al-Bloush, Al-Faieq, Monsef & Sadeghi, 2014). This is exemplified in a study conducted by Iheanachor, Umukoro & David-West (2021) who found that poor product development practices actually increased the likelihood of product failure through poor product performance and low adoption.

The product development process typically starts with idea generation, where potential product ideas are identified based on market research, customer feedback, or brainstorming sessions. These idea-generation sessions are not confined within organizations as seen in a study conducted by Kohn (2005) where it has been recommended that the emphasis should be placed on identifying trends and interpreting them in relation to the firm's strategy and capabilities. This approach allows for the transformation of such knowledge and insights into actionable outcomes (Kohn, 2005).

After idea generation, the product is designed and developed. This involves creating a detailed plan for the product, including its features, specifications, and target audience. It also includes creating prototypes and testing them to ensure they meet the desired specifications. Prototyping is a valuable tool in product development processes (Elverum, Welø & Tronvoll, 2016). It can be used to explore new opportunities or refine existing solutions quickly. (Elverum, Welø & Tronvoll, 2016).

Before the actual product launch, the product needs to go through iterative development and testing to ensure that it meets the desired specifications. Iteration, as stated by Wynn & Eckert (2016), has immense positive effects on product development such as facilitating the gradual

development of knowledge, allowing for concurrent processes, and accommodating necessary modifications (Wynn & Eckert, 2016).

Product development is, therefore, seen as an essential process for any organization that wants to create new products or improve existing ones and each stage of the process is critical and requires careful planning and execution to ensure the product is of high quality and meets customer needs.

Several models have been proposed to help organizations structure and manage their product development processes. These models provide a framework for product development that can help organizations optimize their processes and achieve better outcomes. In the next section of the literature review, we will explore one of the most popular models of product development: design thinking.

2.2 Product Development Model: Design Thinking Framework and Ideation

As mentioned above, in this review, the focus will be on design thinking. Although there is no single definition for design thinking, the American Marketing Association (2021) states that it is a human-centric approach to problem-solving. One may argue that the widely used design thinking process, which is credited to Stanford University's Hasso Plattner Institute of Design, holds considerable prominence (Brown & Green, 2017). This process is often articulated in five phases: empathize, define, ideate, prototype, and test (Stanford D-School, 2023). Some describe design thinking as a mindset while others describe it as a process or toolbox, but there is research stating that it can be a combination of all three (Brenner, Uebernickel & Abrell, 2016). In terms of mindset, design thinking can be characterized by convergent and divergent thinking, strong acclimatization of evident and covert user needs, and prototyping (Brenner, Uebernickel & Abrell, 2016). With regard to process, design thinking is a combination of micro and macro processes. Micro-processes consist of defining the problem, synthesizing, ideation, prototyping, and testing while macro-processes look at the different objectives in prototyping (Brenner, Uebernickel & Abrell, 2016). With reference to the toolbox, design thinking refers to the use of various methods and techniques from various disciplines, including design, engineering, informatics, and

psychology (Brenner, Uebernickel & Abrell, 2016). Nevertheless, design thinking can be used to solve a wide range of problems, from developing new products and services to improving existing ones (IDEO, n.d.). Organizations can foster a culture of innovation and continuously improve their products, services, and processes by employing this approach.

Below, the different stages of design thinking will be explored further, however, the ideation stage will be emphasized as this will be the concentration of the research.

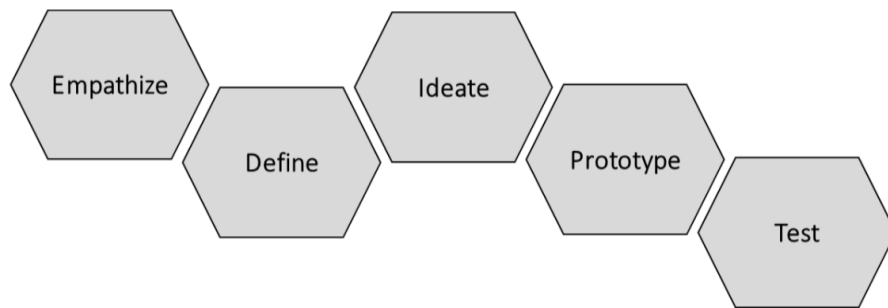


Figure 1. Design Thinking Framework (Stanford D-School, 2023).

Empathy, or the ability to understand and relate to the needs and desires of users, is an important aspect of design thinking. Organizations, by acquiring a deep understanding of their users, can create products and services that truly meet their needs. For example, IDEO, a design and innovation firm, used empathy to create a more user-friendly portable oxygen concentrator for people with chronic lung disease. IDEO was able to gain insight into the difficulties patients faced with existing devices by observing and interviewing them, which led the company to design a new device that was more portable, lightweight, and simple to use (Kelley & Littman, 2001).

Within design thinking, ideation is one of the most important stages because it can result in the ultimate success of an organization. Innovation is the successful execution of creative ideas within an organization. As such, generating creative ideas is the starting point for any innovation process (Amabile, Conti, Coon, Lazenby, & Herron, 1996). The development of successful products or services is heavily influenced by the presence of innovative ideas. Such ideas can be the determining factor in achieving success or failure in this regard (El Haiba, El Bassiti & Ajhoun, 2017). The ideation stage entails the individual or group recognition of new concepts that may result in ground-breaking goods or services (El Haiba *et al.*, 2017). Since ideation is the activity

most usually linked to the creation of original and useful ideas, research has demonstrated that it is a crucial part of the creative problem-solving process (Titus, 2000). However, idea generation is acknowledged as one of the most difficult phases of the product development process (Osborn, 1963). Therefore, it is crucial to record, keep, and maintain all ideas, even those that might not be relevant given the current context of an organization, as they might be relevant in the future (El Haiba *et al.*, 2017). Ideas can also be developed from sources like consumer contacts, markets, and competitors, thus they are not just confined to internal sources (El Haiba *et al.*, 2017).

Testing is another important aspect of design thinking. Design thinking encourages organizations to explore multiple possibilities and test them with users rather than relying on a single solution. This method enables organizations to quickly determine which ideas are promising and which are not. Intuit, for example, used rapid experimentation methods with users to test ideas throughout the development process while gathering behavioral data to improve their global technology platform (Carlgren & Rauth & Elmquist, 2016).

DT, as a methodology, offers the potential for advantageous outcomes in terms of product development. It emphasizes a deep understanding of **users' needs** (Brown, 2008), allowing for the identification of current and future user requirements. Moreover, it instigates a shift in organizational culture towards a more **innovative mindset** (Elsbach & Stigliani, 2018; Kolko, 2015). An increase in **creativity** is another advantage (Lee, Jung & Yoon, 2019). The use of design thinking projects facilitates factors related to group creativity amongst adult learners. Using design thinking, teams can generate novel solutions to complex problems that they would not have considered using traditional problem-solving methods. Design thinking also **fosters collaboration** as it encourages teams to work together and share ideas, which can lead to diverse and creative solutions. Bene & McNeilly (2020) found that design thinking did in fact promote collaboration and was effective in fostering team cohesion as well as avoiding some of the common collaboration problems.

While design thinking offers many advantages, it is not without its potential drawbacks. One of the disadvantages of this approach is the **unpredictability** that surrounds it. Design thinking is a non-linear process that does not always follow a predictable path. The idea of predictability can be seen as a measure of the criteria for success (Stolterman, 2021). The design process may lead to

positive outcomes, but it may also lead to unintended consequences, which can be seen as risky (Stolterman, 2021). Thus, design thinking can potentially make it difficult to predict results and plan accordingly, which is a drawback for companies that need more confidence in their decision-making. Another disadvantage to design thinking is that there is no focused methodological approach – it is widely up to the interpretation of the individuals using it. Instead of listing out specific actions that should be undertaken in the process, design thinking points to “**suggestions for actions**” (Laursen & Haase, 2019). This lack of guidance, in some cases, can lead to insufficient results and ineffective solutions (Laursen & Haase, 2019).

2.3 Product Development within the Swedish startup context

In Sweden, startups have been focusing on creating innovative products that are driven by technology. According to a study by the Swedish Trade & Invest Council (2018), the entirety of Sweden is receiving new technology well. Major companies such as Saab, Volvo, and Scania are investing heavily in AI, but there are also small companies launching products that include AI.

One of the key factors that have contributed to the success of product development in Swedish startups is the country's digital-driven environment. Sweden has been at the forefront of digitalization, with a highly connected population and a strong focus on technology innovation. According to the Digital Economy and Society Index (DESI) report (2022), Sweden ranks as one of the top countries in the European Union (EU) in terms of digital infrastructure, connectivity, and digital skills.

Sweden's digital-driven environment has provided a conducive platform for startups to develop and launch innovative products. The availability of high-speed internet, a highly educated workforce, and a supportive ecosystem of investors and incubators have enabled startups to create disruptive products that can compete on a global scale (Business Sweden, 2018).

Furthermore, Swedish startups have been leveraging digital technologies such as artificial intelligence (AI), machine learning (ML), and big data analytics to enhance product development (Business Sweden, 2022). For instance, optimized machine learning is becoming widely used across many industries and is anticipated to open the door to fully autonomous production facilities in the near future. A key component of AI is improving production optimization through machine

learning and analytics to address complex issues in real-world contexts. For business-critical processes, this method can be applied, leading to cheaper costs, better quality, and performance, as well as less energy use. Planning, asset management, and minor corrective measures are only a few of the short, medium, and long-term goals that AI has the capacity to handle during production processes. Machines that are equipped with internal intelligence systems can produce data that helps to guide maintenance schedules, forecast mechanical faults, maximize output for best results, and streamline workflows (Business Sweden, 2022).

To boost and streamline automation, Sweden's manufacturing ecosystem has already started integrating AI technologies. Swedish businesses are investigating and utilizing AI's ability to automate tasks in current value chains, operations, and functions, create new business models, goods, services, and system solutions, and alter existing value chains and industries into whole new development tracks (Business Sweden, 2022).

Swedish startups have been leveraging the country's digital-driven environment to create innovative products that can compete on a global scale. Digital technologies such as AI, ML, and big data analytics, have enabled startups to develop products rapidly and efficiently. As Sweden continues to invest in digitalization, we can expect startups to play a critical role in shaping the country's digital economy.

2.4 Artificial Intelligence

Artificial Intelligence (AI) is one of the fastest-growing phenomena as it has increased economic efficiency and reshaped new ventures. Today, AI is considered the most important 'general-purpose technology' (GPT) and is expected to reconstruct every industry, just like electricity and the steam engine had previously done (Brynjolfsson & McAfee, 2017).

In the year 2023, when this paper was written, many AI technologies including, 'ChatGPT', an artificial intelligence chatbot developed by OpenAI which was recently released in November 2022, have received public attention for its ability to answer questions and assist humans with several tasks in human-like conversations.

The meaning of 'Artificial Intelligence' (AI) has been discussed for a very long time. But for the purpose of this study, the word AI mentioned here can be understood as the capacity of a machine

to mimic human intelligence such as decision-making, problem-solving, and natural language processing. The core of AI is about developing algorithms and models that enable machines to learn from data, identify patterns and make decisions based on that learning. Machine Learning (ML) is a type of AI that focuses on enabling machines to learn from data without being programmed explicitly by developing algorithms.

AI is seen as a key enabler for various industries including product development. Several researchers (Cockburn *et al.*, 2018; Haefner *et al.*, 2021 among others) argued that AI has great potential to reconstruct the innovation process as it enables users to rapidly collect data, recognize problems, and develop new solutions in the form of products and services at a speed that has never been done before.

Today, information overload makes it harder for managers in firms to make decisions to solve problems and make quick and unbiased decisions on time. But AI has been proven to overcome human constraints in information processing (Cautela, Mortati, Dell'Era, Gastaldi, 2019; Haefner *et al.*, 2021) by removing three limitations namely: scale, scope, and learning enabling the design process to be more human-centered, abductive, and iterative through ‘problem-solving loops’ which collect and analyze real-time data from customers and other stakeholders. These never-ending loops enable AI to learn from user interactions and generate solutions that are always new (Verganti, Vendraminelli & Iansiti, 2020) therefore, with proper data and algorithms, AI has the ability to generate predictions and conclusions and design precise and better solutions over time (Füller, Hutter, Wahl, Bilgram & Tekic, 2022).

The topic of AI is increasingly rising due to its potential to revolutionize how humans live, work and interact with each other as it will bring a transformative impact on the digital organization of innovation (Haefner *et al.*, 2021). AI is expected to transform every industry just as the internet did 30 years ago or electricity 100 years ago (Bughin, Hazan, Ramaswamy, Chui, Allas, Dahlström, Henke & Trench, 2017) and will continue to accelerate in the coming years.

2.5 Importance of Artificial Intelligence in Startups

In the context of innovative organizations, AI is increasingly becoming important for startups to accelerate innovation and growth in the business environment. AI-driven firms can overcome

traditional operational constraints such as scope and scalability, thus the emergence of the concept of ‘AI Factory’ (Iansiti & Lakhani, 2020) which explains the concept of organizations that adopt an AI-first approach to innovation and product development where AI is a key driver of growth and competitiveness, rather than human labour. The advancements in technology would enable businesses to gain significant competitive advantages.

AI can remarkably alter the practice of product development by automating traditional problem-solving tasks into learning loops without typical limitations of scale, scope, and learning (Cautela *et al.*, 2019). Therefore, AI integration can bring many innovative opportunities for startups, particularly in the stage of ideation of product development for several reasons. Firstly, with **idea generation**, AI enables firms to generate new ideas as it can gather enormous data on the market, users' behaviors, emotions, and psychological responses with less bias (Cautela *et al.*, 2019). The algorithm can analyze large amounts of data that humans might have missed, consequently, leading to new solutions with a better understanding of their customers and other stakeholders involved. Secondly, **concept validation** is made simpler as AI can combine vast amounts of real-time insights and research, then interpret and analyze data to clarify customers' problems with statistical evidence which would allow managers to make more informed and better decisions (Füller *et al.*, 2022). Thus, using AI can help the designing step become more human-centered and customized. Thirdly, many studies (Verganti, Vendraminelli & Iansiti, 2020; Fabio A. Figoli, Mattioli & Rampino, 2022) showed that AI is a **creativity enhancement** tool that can overcome humans' limitations and improve their abilities. Humans can use AI in a wide range of products or services or generate ideas as a method of invention (Cockburn *et al.*, 2018) and boost the design of the products.

Moreover, AI can help in **process optimization**, as the tool can identify which area of product or service designs can be improved for better performance while reducing cost. The development process can become more efficient and cost-effective, by improving quality and reducing errors, resulting in a faster rate of innovation (Bughin *et al.*, 2017). Further, Verganti, Vendraminelli & Iansiti (2020) argued that AI's human-centered learning never ends, which means that every interaction with the user counts as an opportunity to do new experiments, thus making the development process a **constant development**. Overall, with the right data and analysis, AI can streamline the ideation stage of the product development process, reduce costs and improve the quality of their products. By leveraging AI, firms can generate more innovative ideas and arrive at

solutions for their customers better and constantly improve to meet the needs of the ever-evolving market.

However, there are several challenges and limitations of AI integration. According to Brynjolfsson & McAfee (2017), full application and integration of AI will take years, if not, decades to change the whole business's core processes and business models. This technological transition requires several involvements from internal and external factors, for example, technical skills. In AI, Haefner *et al.* (2021), mention that several firms **lack the necessary skills** to fully develop AI solutions as it requires expertise and resources to fully understand and utilize constantly-developing AI technologies. Moreover, numerous studies (Haefner *et al.*, 2021; Füller *et al.*, 2022; Truong & Papagiannidis, 2022) also showed that innovative decisions and creations from humans are complex and difficult for AI to replace as it requires intuition, creativity, empathy, and a sense of aesthetics. Technically, AI can only generate ideas from its known world, gathering and combining data from its algorithm. Thus, the ability to create purely new ideas is still questionable (in the short-mid term time from now). Therefore **complex and innovative management decisions** remain difficult to be fully replaced by AI. On top of that, **data limitations** are the challenges that many companies are facing, Bughin *et al.* (2017) stated that data is the heart of disruption and is recognized as a critical corporate asset. Without data, the AI engine can not get started. But given the increasing data output nowadays, in some cases, a concrete time series of data is needed while other times, it may require real-time data which could be a challenge for companies in terms of which data to store and how to obtain sufficient available data (Haefner *et al.*, 2021; Füller *et al.*, 2022) to build the data ecosystem. Moreover, companies may face the problem of interpretability or known as 'Black Box', which is an automated decision system where the deep neural networks learn over an enormous amount of data and contribute to an ultimate decision without explainable reasons (Pedreschi, Giannotti, Guidotti, Monreale, Ruggieri, & Turini, 2019) and humans have difficulty figuring out how the system reaches the decision (Brynjolfsson & McAfee, 2017; Manyika, Chui, Miremadi, Bughin, George, Willmott & Dewhurst, 2017). This lack of transparency means machines may contain hidden biases, derived not from humans but from the data provided to train the system, which possibly leads to unfair or wrong decisions. Lastly, there are risks of **ethical and legal regulations** about AI technologies which could possibly take decades to implement as it requires complementary changes on many

dimensions such as regulations, policies, and social acceptance (Brynjolfsson & McAfee, 2017; Manyika *et al.*, 2017) which could prolong the product development process in companies.

Managers who want to incorporate AI into their workflow need to carefully determine which tasks are suitable for machines and humans (Bughin *et al.*, 2017). Interestingly, statistics from (Bughin *et al.*, 2017) showed that an estimated 60 percent of all occupations have at least 30 percent technically automatable activities. Regarding tasks and occupations, despite several arguments about whether AI can or will replace human jobs or not, one simple answer from Brynjolfsson and McAfee (2017, p.11) is, “AI won’t replace managers, but managers who use AI will replace those who don’t”. To summarize, there is no one-size-fits-all approach to the integration of AI (Füller *et al.*, 2022). Entrepreneurs and managers need to rethink how they innovate and utilize these tools and establish their own operations with arising new opportunities. The role of AI now is to be an assistant to innovators and entrepreneurs which means that the role of humans now is to learn how to be adaptable, find ways to leverage opportunities and identify challenges in the context of AI.

2.6 AI Tools in Product Development

Given the significant improvement in the artificial intelligence space, AI holds enormous potential in assisting with product development during the innovation process as it can accomplish processing massive amounts of data, classification, clustering and prediction tasks at scale which may be able to assist humans in cognitive-intensive support tasks (Truong & Papagiannidis, 2022).

AI tools most commonly used in product development include (1) Natural Language Processing (NLP) (Grguric & Drvenka, 2020), which are AI tools that facilitate interactions between computers and humans to help analyze customer feedback and reviews, which ultimately allows firms to gain a better understanding of their customers and pinpoint their areas of product improvement. (2) Computer Vision (Grguric & Drvenka, 2020) tools can be used to produce and analyze images and videos to identify trends and patterns in customer behaviors. (3) Predictive Analytics tools are used for analysis and forecasting future behaviors and demand, which can play important roles in marketing strategies and product development. (4) Chatbots are tools used to help by providing personalized recommendations for users and in customer support and assistance

to improve customer satisfaction and retention and lastly, (5) Neural networks are tools used to analyze large amounts of data and identify patterns and correlations.

3. Methodology

3.1 Research design

The aim of this study is to investigate the present ways in which Swedish startups utilize AI tools for product development, and in turn, determine what the opportunities and challenges are in the implementation of AI tools. According to Bell, Bryman, & Harley (2019), this research is inductive in nature and aims to advance our understanding of entrepreneurship rather than support or contradict preconceived notions.

This study will employ a qualitative research approach through semi-structured interviews to collect the necessary data (Bell, Bryman & Harley, 2019). A semi-structured interview approach will allow for flexibility in case the interviewee wants to contribute more information and in case more questions arise that are not outlined in the guideline (Bell, Bryman & Harley, 2019).

The research will be conducted with eight Swedish startups that use AI tools directly or indirectly for product development.

3.2 Data collection

In order to collect the data, we sought out technology-driven startups located in Sweden that utilize AI in some form within product development. Convenience sampling was employed to select startups for this study due to practical considerations, such as limitations in time, and ease of accessing the identified sources (Bell, Bryman & Harley, 2019). We selected startups from a wide range of industries, which was a strategic choice that allowed for a comprehensive understanding of the prevalence of AI across different sectors. AI is a rapidly growing field, and its applications are not limited to a specific industry. So, by looking at startups from diverse industries, we may learn more about the adaptability and possible effects of AI and product development on many industries. Studying startups across a range of industries also enables us to spot particular difficulties and opportunities that may emerge in certain businesses as well as general challenges and opportunities related to AI adoption within product development. Using this knowledge, methods and recommendations for successful AI integration across industries can be developed.

Startups were selected through LinkedIn, through an online search, through our network, as well as through incubators around Sweden. We scheduled interviews, both online through Zoom calls, and in-person meetings, with these startups to collect data. The decision to find startups online for our thesis on AI tools was driven by the fact that our research topic is highly technical in nature. As we are focusing on AI tools, we assume that startups operating in this space would have an online presence. The reason for this assumption is that AI is a rapidly evolving field that heavily relies on digital technology. It is, therefore, logical to expect that startups operating in this area would have a significant online presence, whether it be through a website, social media, or other digital channels (Vinnova, 2018). The data was gathered through semi-structured interviews with product development managers or individuals who were directly involved in the product development process. All interviews were conducted between 24 March 2023 and 18 April 2023 and lasted approximately 60-90 minutes each. To ensure consistency in responses and prevent misinterpretation from translating interviews, all interviews were conducted in the English language. We collected data from eight startups, chosen for their ability to provide informed and reliable information on the utilization of AI tools in their product development. (See Table 1)

Table 1: Interview respondents

No.	Respondents	Age range	Position	Industry	Company age
1	Male	30-35	Head of product	Human Resource	5 yrs.
2	Male	50-55	CEO	Supply Chain	3 yrs.
3	Male	55-60	Chairman	Medical Laboratory	3 yrs.
4	Male	25-30	Business Development	Agriculture	2 yrs.
5	Male	35-40	CPO	IT	6 yrs.
6	Male	25-30	Machine learning engineer	IT Consulting	6 yrs.
7	Male	30-35	AI and Software Consultant	IT Consulting	3 yrs.
8	Male	30-35	Co-founder	Architecture	3 yrs.

3.3 Data analysis

To analyze data from the eight audio-recorded interviews, the thematic analysis technique is applied to identify key themes and patterns within the collected data (Braun and Clarke, 2006; Bell, Bryman & Harley, 2019). This analysis technique offers an accessible and theoretically flexible approach to analyzing qualitative data (Braun and Clarke, 2006) and enables us to have a better understanding of the high-growth AI technology developments and changes in organizations and societies.

Following a method by Braun and Clarke (2006), we began the first step of thematic analysis by familiarizing the collected data. All records were transcribed into 71 pages, then the two authors read through the text to get familiar with it. After that, the data was separated into individual component parts and the text was colour-coded and then given labels to describe their content and sorted into similar groups. These initial codes allowed us to have a better understanding of the recurrence points throughout the data as we were able to spot similarities and differences between the interviews. As the analysis progressed, a potential of 17 themes related to the research questions was generated. Later, themes were compared to the literature review and we were able to discover correlations and links in the acquired data. Themes were reviewed, discarded, combined, and distilled into 11 refined themes. Finally, as a result of this method, we arrived at the stage of naming and defining all themes regarding challenges and opportunities of AI Integrations in product development of Swedish startups which will be later displayed in the findings and discussion chapter.

3.4 Ethical Consideration

The authors were well aware that the topic concerning tools and technology within the firms' product development processes might raise an issue of confidentiality of sensitive information from the correspondents (Bell, Bryman & Harley, 2019). The issue is addressed carefully in this thesis and thus before beginning every interview, verbal consent was acquired to record the audio for transcribing. Additionally, the interview guidelines included the consent and reassurance that all transcripts were kept anonymous and confidential for the purpose of this study and all informants gave their consent.

4. Findings

The findings from the empirical data collected from semi-structured interviews will be presented in this chapter. The findings consist of themes identified in challenges and opportunities of AI integration as well as which and how AI tools are being utilized within startup organizations across industries.

4.1 Challenges of AI Integration in Product Development Faced by Swedish Startups

Even though AI tools are often seen as the solution to help companies streamline their product development processes, 6 themes emerged regarding the challenges of utilizing AI tools in product development namely, (1) Limited context awareness (2) Limited technical and professional skills from users (3) Data Limitations (4) High cost (5) Over Reliance on AI and Lastly, (6) Ethical concerns.

4.1.1 Limited context awareness

Theme	Respondents' quotes
1.) Limited context awareness	"We have both software and hardware components in our product lines [...] I think it will be much easier to use AI in building software solutions. Because I guess in the near future, you can basically tell chatGPT to build this type of application for me, and it will basically give you software as an output whereas I don't think that, at least chatGPT is not able to replace the hardware developer because he will still have to go there has to build stuff and put the cables together and all this" (Manager 4)
	"[...] and in some technical areas, like if you're looking at in detail how to do a PCR workflow or the detailed steps, it cannot really understand exactly how we do in our lab. So this is something that we still have to add a lot of information about." (Manager 3)
	"I've tried to use the language models to generate more technical language, and it hasn't been as good as that. So I haven't tried a lot, it didn't perform that well." (Manager 6)
	"[...] for example, rooting the bugs or identifying the right place for where an issue or analysis to be done is quite manual [...] they usually have a first line of people who look at incidents happening." (Manager 2)

These findings indicate that integrating AI in the ideation stage of product development is difficult because AI has limited context awareness of particular complex tasks, such as hardware production. For instance, Manager 4 mentioned the difficulty of implementing AI tools to a hardware production where it requires labour, high agility, and context awareness.

Manager 3 discussed that AI was unable to perform complex tasks, such as laboratory medical procedures, which are considered too complicated to implement AI in their process. Similarly to this, Manager 6 also mentioned the experience of using AI for complex computing which under-performed. Additionally, Manager 2 emphasized that the task of identifying problems and analysis is still done manually, reflecting on how AI is unable to solve complicated problems, especially when incidents arise.

Thus, the findings represent an inability to replace human labour as the first theme of challenge in AI integration within the ideation stage of product development.

4.1.2 Limited technical and professional skills from users

Theme	Respondents' quotes
2.) Limited technical and professional skills from users	<p>"Unlike the general saying that AI knows everything, and solves everything for you. That's a misconception. It doesn't know anything. Actually, it gives you output depending on what you ask them directly, or what you've taught them to be answering [...] the input is much more complex and it's good to be skilled to use it and to give the input correctly [...] If you give unqualified or low-quality data to it (AI), the output will be even worse. The results will be bad [...] it doesn't work that way you need it to because you need to use it correctly" (Manager 2)</p>
	<p>"I think you can produce good texts for basically any area you want, but usually have to have the right prompts and so on. And that's a skill in itself that I haven't spent a lot of time improving. So I think it could be of more value, but I haven't taken the time to use them to enter, let's say technical text." (Manager 6)</p>
	<p>"So you can't really ask ChatGPT to do anything that you don't know something about today. One of the big limitations of AI is that you can't go as a novice or someone who is not knowledgeable and ask it to write up everything for you. Because then 90% might be correct, but 10% might be so wrong, that it's gonna cause trouble" (Manager 3)</p>

	"[...] I still think there's a large need for human polish. And I think we'll have more and more important to distinguish since it will be so easy to generate examples. (It) will be more important to be able to tell what are good examples or not, for example, using it to generate code. I don't think it's fundamentally different from how we code today, we look at Stack Overflow. [...] We still take outside opinions terribly much more important than to distinguish ourselves, is this a good line of code or not? What are the drawbacks?" (Manager 6)
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Another important limitation of using AI tools is not only from AI itself, but also from the users. Manager 2 and Manager 6 emphasized the importance of high-quality data and technical skills needed for utilizing AI effectively as the algorithms process and give solutions based on the data input.

Additionally, Manager 3 and 6 mentioned that they need professional knowledge and expertise to fact-check information and polish solutions derived from AI as the machine can be irrelevant and unqualified for the work needed.

4.1.3 Data Limitations

Theme	Respondents' quotes
3.) Data limitations	"[...] the newer models, of course, support a multitude of languages, which is great, but they're still not watertight, they're still not good enough in certain languages. In English, excellent, because the training data is from [...] you know, most of the tools are developed in the US, which means that they are more developed for English speaking market" (Manager 1)
	"Another biggest aspect is like [...] users might not know what is behind those AI bots [...]. (There is) like millions of algorithms with connected neurons and everything [...] but in general, we don't know how the information is being processed, how the data has been tested, or how the data has been collected, and then what type of data is being used to get those results. So because it's kind of like working behind the curtains" (Manager 7)
	"There are a lot of biases in the information, especially if you are using commercial AI tools, they might have the limitations of the data, as well as the way they are trained, and could not be trustworthy [...] so it's up to the user how you process it" (Manager 7)

	"One good example could be using chatGPT, it is trained with the data available until September 2021. So basically it doesn't know anything after that [...] When I was working on client projects with the recent Python model, which was released in December 2022. I was actively trying to go through the process and try to figure it out with chatGPT and then it always pushes me to the previous version of the package, because it doesn't have the actual information about this. Maybe you do this, you do this" (Manager 7)
	"It's a black box, you don't really know what it does [...] You can't really have control over it in the same way as a conventional algorithm, where you can change one thing, and it'll do something differently. you can actually see if it's this thing here that is the problem. AI is more like, you just do something and you can't really know why it does it but if you're lucky, it works, basically." (Manager 8)

As AI systems rely on large chunks of data to learn and make decisions, this can lead to many data limitations. This is clear from many of the respondents. Manager 1 mentioned the lack of foreign languages data within AI tools because most tools are developed in the United States where English is the official language.

Manager 7 emphasized the lack of transparency of AI tools due to the complexity of AI algorithms, which makes it difficult to understand how the information is being handled and processed before delivering the outcomes which is known as ‘Black Box’. This lack of transparency can make it challenging to interpret and troubleshoot errors that might occur in the working process. It could be difficult for developers to identify the root cause of the problem which could lead to significant delays in product development. Subsequently, the lack of transparency also makes it difficult to ensure that AI systems are producing fair and unbiased results. Moreover, there is also the problem of data availability in a case where the data in ChatGPT is not up-to-date, limiting the desired outcome.

4.1.4 High cost

Theme	Respondents' quotes
4.) High cost	"And in many parts of the projects, we could have used AI. But we choose not to because it's more expensive or less cost-efficient because it requires a level of resource within our team. And it requires a bit of added complexity compared to different projects. So we try not to use it where it doesn't actually lead to a cost efficiency [...]" (Manager 5)

Another limitation of using AI tools in product development illustrated above is the cost of developing and deploying AI systems. One project mentioned by Manager 5 could have used AI but they refused to do so as it was more expensive and less cost-efficient, requiring significant investment in data collection, algorithm development, hardware and software systems and storage.

4.1.5 Overreliance on AI

Theme	Respondents' quotes
5.) Over Reliance on AI	"The challenge of AI is that people are going to become lazy and they're going to assume that because AI said so, it's correct" (Manager 3)
	"So I think it's will be a challenge to actually keep on working on it and not just having the first working prototype because people are lazy in general" (Manager 6)
	"I think, the risk of homogenizing a lot of things is very similar, let's say 10 people using the same language models to generate their marketing pitches, I think there's a risk of things being very similar." (Manager 6)
	"[...] you become so reliant on the tool that you can't do without it [...] so you start trusting the AI more than yourself and your team, basically. When the AI tells you something, that's what you go for and sometimes it's overconfident [...] It tells you this is how it is but it isn't, it doesn't do the fact-checking, really, or it doesn't know everything [...] then it actually ends up not being correct and you introduce unnecessary bugs" (Manager 8)

Instead of relying on human experts, asking and using AI tools to help may actually hurt the performances of the team. Manager 2 and Manager 6 had similar concerns stating that using AI can lead to decreased human effort to try and produce more work, which could affect the organization's decision-making process in the future. Manager 6 further highlighted the problem of homogenization which could happen if users use the same tools based on similar existing data and patterns which consequently, produces similar solutions and recommendations. This can limit creativity and innovation within the ideation stage.

Moreover, using AI tools can also cause problems when it fails to resolve situations. In the case of Manager 8, rather than saving time and resources, it increased the workload instead.

4.1.6 Ethical Concerns

Theme	Respondents' quotes
6.) Ethical concerns	<p>"I think the biggest challenge is not the technical limitation, it's more of an ethical question. We know what's coming, like in 10 years, there are going to be basically no technical limitations, we have huge training data, we have content of the internet, we can just hype it and train it with like, puking, whatever doesn't matter [...] it's not what I am afraid of, or what I see, but it's more like if will this be used to the benefits of us? Or will this be used to benefit corporations to acquire our data or like privacy in order to have access to these new technologies?" (Manager 1)</p>
	<p>"The only challenge is that crooks can use it. You see today, if you record a voice for maybe 10 seconds, you can get the text to speech, which will then speak in your voice, with your intonation and with your rhythm and everything. Yeah, and this means that you know the potential for doing impersonations." (Manager 3)</p>
	<p>"Everything takes so much time [...] I think the complexity for us is immature legislation and immature customers [...] legislators don't actually always know technology. Customers don't actually always know technology. So it took around three years to get it audited by the authorities [...] I think public perception is also a challenge. In many ways privacy is always going to be an issue for most AI projects" (Manager 5)</p>
	<p>"We don't have any direct sense right now how it will be regulated around the world, there is no regulations and there is no way of kind of controlling it right" (Manager 7)</p>
	<p>"[...]the AI safety. Since the old AI tools have become more powerful every day. I think it's a little bit dangerous that you don't really know [...] when AI can, for example, have access to the internet, and maybe AI can start a business itself [...] let's say in a couple of years, and it can start developing products or software itself without people actually asking it to [...] that can be a really big challenge. Because then you have to compete not just with other companies, but you have to compete with AIs. And I mean that could really affect the work environment. In general, It's exciting, but it's dangerous in the way that it will challenge the economy and it will challenge how we as a society are built based. (Manager 8)</p>

Regarding the ethical issues of artificial intelligence, our findings show a wide range of concerns and limitations. Firstly, Manager 1, 3, and 7 shared their concerns about the lack of control regulations and directions and mentioned how data privacy could be harmed and used with bad intentions.

Secondly, as mentioned by Manager 2, the complexity of AI raises many ethical questions and concerns in society, prolonging the process of launching any new services and products as it needs certain understanding from authorities, markets, and customers.

Additionally, Manager 8 raised concerns on how the advancement of technologies could potentially lead to a different labour market where humans need to compete with AI, which could affect the economy as a whole.

4.2. Opportunities of AI Integration in Product Development Leveraged by Swedish Startups

There were several themes found in terms of the opportunities for AI integration within the ideation stage of product development within Swedish startups, namely increasing efficiency, knowledge acquisition, enhancing user experience, cost efficiency, and innovation which will be explored below.

4.2.1 Increasing Efficiency

Theme	Respondents' quotes
1.) Increasing efficiency	"AI is a very, very strong friend [...] to speed up the process, it's absolutely a really good productivity tool. I can just key input and it spits out code. Of course, you have to check the code but it's still more fun because you can be more creative with it. You can give it other conditions to think about. You're not getting tired. You're like managing an AI to spit out more awesome code" (Manager 1)
	"If we tell Chat GPT what we want, it just spits all these things out in a few minutes. And what we do then is, we spend our time checking for accuracy, and checking for compliance with the requirements of regulations and so on. And this means that we have become editors, and reviewers of what Chat GPT has produced, rather than the document creators, which takes a long time. So I would say that this saves about 80% of our time [...] and if we can describe accurately what we want, it produces a better first draft, then we can do it ourselves." (Manager 3)
	"Once for generating a first draft, for a product page we asked ChatGPT to fill in instead of having lorem ipsum. We asked it to fill out some frequently

	asked questions about this type of product, it was actually quite good at that." (Manager 6)
	"It helps to streamline the overall approach in terms of digital product development, there are lots of aspects you have to consider, like data collection, developing use cases and testing it and installing it. And in a small organization, you don't have all the resources [...] you might not have quality students, you might not have dedicated testers and these AI tools and technologies are really helpful for an individual to do all the tasks, especially for consultants" (Manager 7)
	"I think tedious and time-consuming tasks can be made much simpler and more efficient using AI tools [...] So we don't have to spend so much time on administrative tasks, we can spend more time basically focusing on our product development. I think there are lots of potentials and more to come" (Manager 8)

These findings suggest that AI integration within product development increases efficiency by streamlining their operations, decreasing the amount of time spent on laborious tasks, and allowing them to concentrate more on the actual idea generation. In various quotes, the opportunities of AI technologies for product development are emphasized. For instance, Manager 1 highlights the productivity gains that can be achieved with AI tools, noting that it can help speed up coding tasks and allow developers to be more creative.

Manager 3 emphasizes the role of ChatGPT in document creation, with AI generating the initial draft, while the team members focus on accuracy and compliance. Similar to this, Manager 6 cites that using AI technologies to produce high-quality prototypes and mock-ups will be much easier.

Manager 7 also highlights the value of AI tools in streamlining the overall approach to digital product development, especially for small organizations that may not have all the necessary resources, such as dedicated testers. Manager 8 claims that AI tools automate laborious procedures and make them simpler, giving up more time for product development. Thus, these findings suggest that AI integration in product development can offer significant opportunities to startups, including increased productivity, efficiency, and the ability to focus on more valuable tasks, such as ideation.

4.2.2 Knowledge Acquisition

Theme	Respondents' quotes
2.) Knowledge Acquisition	"[...] and then, of course, translating text or rephrasing wording. It's not a replacement tool, but more of an inspirational tool, at least for ChatGPT" (Manager 1)
	"[...] with ChatGPT, we can now get very good and accurate translations" (Manager 3)
	"It's been very helpful when you learn about new concepts and new areas because when you're doing advanced product development, like us, it's impossible to know all the areas that are needed, to learn about new technologies or new concepts or understand new technologies and so on. I think it has been really helpful in quickly summarizing a very complex topic into a few sentences which allows us to very quickly understand new topics and new areas, way faster than we could before". (Manager 4)
	"I feel like the threshold to take on complex problems will be lower. And hopefully, that will lead to more people taking on big and complex problems and creating more and more startups in the future" (Manager 4)

Another theme that was uncovered was the use of AI tools in acquiring knowledge. In the ideation stage, knowledge acquisition is essential for organizations to come up with new concepts and spot opportunities. The managers observed that using AI tools can facilitate a quick understanding of novel ideas and technology. Managers learn new topics more quickly than before by using AI tools, which allow them to quickly summarize difficult topics. It also aids in translation and rephrasing wording, which is helpful in communicating with international partners and customers, and in creating more inclusive products. By using AI tools, startups can streamline their ideation process and make better use of their time and resources, ultimately leading to more successful product development.

4.2.3 Enhancing User Experience

Theme	Respondents' quotes
3.) Enhancing User Experience	"For our sake, when the input is an image and the output is anonymous data, that black box effect increases integrity in the system because it helps to remove the possibility of somebody hacking both sides of our systems and looking at the system and trying to de-anonymize all our data." (Manager 5)

	"In terms of user experience, there will be lots of data from the customer's side, if we use that properly with some AI models, it will help quite a lot in terms of enhancing the product features and qualities for customer experience" (Manager 7)
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Integrating AI into product development can greatly enhance the user experience, which is a critical focus in the ideation stage for startups. The first quote suggests that integrating AI into product development can improve the user experience by using customer data to enhance product features and qualities. The second quote highlights the potential benefits of using AI to anonymize data. By using AI to anonymize data, they can increase the integrity of their systems and protect against potential hacking attempts. This can help build trust with customers who are increasingly concerned about data privacy and security.

4.2.4 Cost Efficient

Theme	Respondents' quotes
4.) Cost efficient	"And above all, what we're going to do is, we are going to expand the work that we're doing with AI, and we're going to do more work with less people" (Manager 3)
	"Comparing it to competitors, we're producing something where our end product is way more cost-efficient. And at the same time, also more reliable and at the same time also providing more valuable insights." (Manager 5)
	"AI has helped us to be the first and only audited and approved people counter or technology within physical retail stores. Without AI, that would not happen (with AI) we're doing that at a fifth of the cost, and increasing the level of insights, reliability and accuracy by three to seven times. So I mean, those metrics would not be possible if we wouldn't have chosen AI to begin with" (Manager 5)
	"I don't think we will bypass humans entirely but it will allow fewer people to do more, allowing more independent people to create products and allowing specialists to automate a lot of manual work to be able to focus on the details, and that sort of thing" (Manager 6)

Startups frequently encounter resource limitations and the desire to maximize cost effectiveness during the ideation stage. In this regard, applying AI to product development can be advantageous. There is a definite trend toward employing AI to accomplish more with fewer employees. This is clear from Manager 3 and

Manager 6, who emphasize how AI has the potential to increase productivity while decreasing the demand for human personnel, which in turn, cuts the costs of human labour. Startups are also utilizing AI to create products that are more cost-effective and offer more insightful data than those of their rivals, which is highlighted by Manager 5. Manager 5 also mentions that the cost, accuracy, and dependability metrics have significantly improved as a result of the usage of AI.

4.2.5 Innovation

Theme	Respondents' quotes
5.) Innovation	"In the future the AI could create a simulation for development work [...] and it'll be something that anyone in the company could really do at that point" (Manager 3)
	"(AI) allows for scaling [...] and there's a lot of opportunities" (Manager 5)

Innovation is a top priority for startups during the ideation stage, and the use of AI can significantly boost and improve the innovation process. The quotes provided emphasize the potential advantages of AI in encouraging creativity in companies. Manager 3 emphasizes how AI can generate simulations for development work, allowing employees across the firm to participate in this kind of work. AI shortens the amount of time and resources needed for development work by automating simulation production. A stronger capacity for innovation results from the faster iteration and experimentation made possible by this enhanced efficiency. Additionally, by making development work accessible to a wider range of employees, AI promotes a collaborative and inclusive environment where fresh perspectives and ideas can be shared, fostering innovation throughout the organization. Manager 5 highlights the scaling capabilities of AI. AI frees up significant time and resources that may be reallocated towards activities that are more focused on innovation by automating repetitive and routine tasks. This enables companies to concentrate their efforts on exploring new ideas and creating ground-breaking products.

4.3 AI tool utilization within Product Development

AI Tools	Respondents' quotes
	"Since ChatGPT was available we've been using that quite a lot, especially when we are programming and getting delegates' input on how to solve certain issues we code" (Manager 4)

	<p>"Now, what we will be doing is, we'll be using AI to help us with the data structures. And what we're doing now is we're taking all of the information we have and we are putting it into tables, which are sort of suitable for invitation into databases like SQL type, structured query language, the databases, which can be very searchable. Now, there are many philosophies on databases today in data storage, and how to deal with big data. And these large language models may challenge in the future, the way that we collect and store data. Because structuring data in itself is a very good exercise, but also is somewhat limiting. Now, when you have a large language model, then it looks at these big chunks of text, or the things that people do when they create tables and distill the information into something which is searchable and usable and presentable in a user interface, for example, which is consistent and which provides only the information that you want, AI will be able to do that." (Manager 3)</p>
	<p>"Cloud computing is a tool that we use, Python is a tool that we use. We also I think, in some parts, were using open source projects. I mean, going forward within five years, I think many parts of every software company will utilize other tools like ChatGPT, that you mentioned earlier, I think it's going to have a massive impact in software development." (Manager 5)</p>
	<p>"What we are using, and what we're seeing a lot of customers interested in now is our large language models. For example, ChatGPT integrating with their data or using it to help them generate text. A lot of people are interested in optimizing customer support and that sort of thing. (Manager 6)</p>
	<p>"So now it's much easier to develop tools based on this model (ChatGPT). There are a lot of new frameworks about how to deal with models, for example, a framework called LangChain in Python that works to connect these language models with data sources with other language models with the internet searches and that sort of thing to enable more complex products."(Manager 6)</p>
<p>2) Language Model - Gthub Copilot</p>	<p>"So nowadays we are trying to reduce our coding time using this GitHub copilot, it's a really handy tool when you're debugging. So it saves quite a lot of time in coding instead of spending, like hours in debugging, we can spend that time developing new algorithms and new approaches." (Manager 7)</p>
	<p>"Github Copilot is probably the one I'm using the most because it's the software that is integrated with the program that I'm using to write my code....it's basically like a virtual assistant for your coding...when I write something in my code here, it gives me suggestions for how I want to write it. For example, to create a new variable to store the coordinates, I can write that as a comment and it gives me all the code that I need. So that's super useful when you're coding because most of the time you know exactly what you want, you know what you want to do, but you don't know exactly how to write it. And it gives me suggestions on the fly for how I can do that."</p>

	(Manager 8)
3) Data generator	"In terms of the product development cycle itself, like collecting data and developing test cases...we use quite a lot of AI tools like data generators...there are tools where you can simulate your data. Because we are dealing with really small organizations without any kind of data we have to simulate the environment and how the data can be collected in the organization and work equilibrium. That's the kind of useful tool we're using right now." (Manager 7)
4) Automatic Speech Recognition	"So we're using automatic speech recognition to translate audio waves into text [...]" (Manager 1)
	"For example, there's software to collect meeting notes on the fly having it go from speech to text, so you can have a transcript of your meeting." (Manager 6)
5) Natural language understanding (NLU)	"We're using NLU and natural language understanding where we pipe all the waves of text into the NLU to understand the intent behind the sentence. And depending on if it's a positive or negative emotion or an intent where the candidate or recruiters don't understand what's being said, or if they need more time, that triggers different logic depending on the intent." (Manager 1)
6) Modeling tools	"For our avatar, we use a tool from Nvidia which allows us to take in all the sentences that the avatar should say, and from that the AI modulates the model to mimic the object with your waves. So it creates sentences and gestures on the avatar. So it feels like natural lip-syncing. This is like super hardcore. But it's very exciting technology. So basically, we're inputting all the files to the modeling tool, and then that gives us back animation sequences that are mapped to the face and gestures and eyes, eyebrows, and smiling." (Manager 1)

AI tools benefit organizations in the ideation stage by offering a variety of functions that improve the creative process and enable more effective product development.

From these findings, ChatGPT, which is often used to program and resolve coding challenges, is one of the most utilized AI tools described. Large language models like ChatGPT are being combined with data to generate text, and there is a growing interest in applying AI to optimize customer service. It serves as a valuable resource for brainstorming coding ideas and overcoming technical hurdles, ultimately supporting the ideation process in developing software products. Github Copilot, another well-known AI tool, is used to shorten developers' writing time by proposing code snippets.

Further, data generators are being utilized in the product development cycle to replicate data and test cases, while tools for automatic speech recognition (ASR) and natural language understanding are being employed to translate audio waves into text and decipher the meaning of spoken words. Python and cloud computing are also highlighted as commonly used tools in the creation of startup products. In the upcoming five years, managers anticipate that these tools will continue to be heavily utilized. Additionally, there is growing interest in creating new frameworks that link language models to data sources, and other language models in order to enable more complex products.

Overall, these tools streamline processes, automate repetitive tasks, and enhance productivity, enabling entrepreneurs to focus more on creative thinking and developing progressively more complex and innovative products. Managers anticipate that the usage of AI tools will increase in the next few years, allowing for the creation of progressively more complex products.

5. Discussion

This chapter offers a discussion and analysis of our empirical findings, stating how the findings answer our research questions and their relation to the literature review.

5.1 Challenges of AI Integration within the Ideation Stage of Product Development

Based on the literature review, our findings show both similarities and differences regarding challenges in AI integration within the ideation stage of product development. In accordance with Brynjolfsson and McAfee (2017), it is evident that the full implementation of AI is far from perfect as there are numerous challenges and limitations from different stakeholders including technological, organizational, regulatory, user-related, market-oriented and resources-based factors.

The primary findings show that AI systems are lacking context awareness in complex tasks in the ideation process, such as tasks related to hardware development, running lab procedures, writing complex codes and solving ad hoc problems (See chapter 4.1.1) as these tasks require a thorough understanding of human behaviour, social interaction, and intuition. The ability to understand the nuances and complexities of such situations is still lacking in AI tools today. This is related to the topic of AI's lack of creativity mentioned by many researchers (Haefner *et al.*, 2021; Füller *et al.*, 2022; Truong & Papagiannidis, 2022). Because AI tools rely heavily on pre-existing data and algorithms to make decisions, it might lack the broader context of understanding. Therefore, it cannot handle nor solve unpredictable situations, as highly skilled professionals can.

This goes hand in hand with the challenge of limited technical and professional skills from users. The problem of lacking a skilled workforce to fully develop AI solutions is also supported by the literature (Haefner *et al.*, 2021). What we found out is that it is not just the technical skills that are necessary to use AI tools, but also knowledge and expertise in certain areas. For example, when asking ChatGPT a question, a natural language model tool for solutions, the user who asks needs

to have the background knowledge to comprehensively understand and apply these solutions in practical terms.

Further, numerous challenges about data limitations from the informants (See chapter 4.1.3), such as data availability and suitability when using AI tools, portray how companies can struggle to obtain and store sufficient available data for their data ecosystems which could lead to ineffective results. This is, again, in parallel with several researchers (Haefner *et al.*, 2021; Füller *et al.*, 2022). The issue of transparency of data and the lack of interpretability, or so-called 'Black Box', is that companies are unable to understand how AI arrives at particular results. This is in line with the literature review (Brynjolfsson & McAfee, 2017; Manyika *et al.*, 2017). This lack of transparency may result in a sense of uncertainty, as it is difficult to predict how AI systems will behave in real-world situations.

Our findings reveal that there are correlations between challenges facing AI integration within the ideation stage of product development. The limited context awareness of AI is due to both sides of the screens, from data limitations in the tools *and* the limited technical and professional skills of users. If the AI lacks sufficient data to suit the problem at hand, the solutions it provides may not be effective. Additionally, if the manager is short of knowledge and skill to use and understand the AI systems, the process of AI integration cannot be completed. In other words, to utilize AI tools effectively requires high-quality data available that suits the situation needed along with technical and professional skills from users who know how to apply the solutions practically.

Despite previous research showing that AI enables firms to generate new ideas with enormous data with fewer biases (Cautela *et al.*, 2019) and enhance creativity in product development (Cockburn *et al.*, 2018; Verganti *et al.*, 2020; Fabio *et al.*, 2022), we uncover the contradiction in the challenge of overreliance in AI (See chapter 4.1.5). The risk of humans heavily relying on AI systems can lead to a decrease in creativity. Also, it can result in homogenization as different groups of people can use the same AI tool such as ChatGPT to arrive at the same solutions, thereby new innovation can not thrive. On top of that, in some tasks, AI may provide solutions from limited existing data which lacks context and intuition awareness, which may fail to address real-world situations.

Blindly following AI guidelines may backfire and hurt the performance and speed of the team instead of helping.

Finally, regarding ethical concerns in the findings, the issue of regulations and public acceptance is related to previous research (Brynjolfsson & McAfee, 2017; Manyika *et al.*, 2017) as AI-involved services and products are still seen as harmful and questionable in authorities' eyes, resulting in a longer process of product development. Different AI regulations in various countries also affect their working processes.

Interestingly, some informants who integrated AI tools professionally in their line of work also expressed personal ethical concerns regarding AI. These concerns include the lack of directions and regulations from authorities, which could potentially result in data privacy issues and other unethical wrongdoings. In addition to these concerns, there is growing apprehension over the impact of AI on the job market which could have a significant effect on the future economy.

5.2 Opportunities of AI Integration within the Ideation Stage of Product Development

Though the integration of AI may present many challenges, AI will continue to evolve, and startups must learn to adapt and take advantage of the opportunities it presents. Our findings in the previous chapter highlight many opportunities and benefits of integrating AI within the ideation stage of product development in Swedish startups. As previous research suggests (Cockburn *et al.*, 2018; Haefner *et al.*, 2021) AI has the potential to reconstruct the innovation process by allowing users to gather data quickly, identify issues, and create innovative products and services at a rate that has never been achieved before. According to our findings, AI is already reconstructing the product development process through increased efficiency, rapid knowledge acquisition, enhanced user experience, cost-effectiveness, and advanced innovation.

Our findings uncovered that in terms of increasing efficiency (See chapter 4.2.1), the incorporation of AI enhances efficiency by optimizing operational processes, reducing the time invested in tedious tasks, and enabling a greater focus on ideation activities. Several managers stated that the

integration of AI has helped them in reducing their time spent on routine jobs, allowing them to devote their time to more creative tasks. Another manager stated that it helps in data collection cases, where personnel may not be available. AI, in that case, has the ability to collect data quickly which is helpful for the ideation stage of product development. These findings are supported by the previous literature (El Haiba *et al.*, 2017) that external sources, such as consumer contacts, markets, and competitors, contribute to the development of ideas. In addition, the study by Cautela *et al.*, (2019) also states that AI enables organizations to come up with new ideas rapidly by compiling data on the market, user behaviors, emotions, and psychological reactions with less bias. Data that people might ignore can be analyzed by the algorithm, creating innovative solutions with a deeper understanding of customers and stakeholders for managers.

Furthermore, in the ideation stage, knowledge acquisition is essential for companies to come up with new concepts and spot opportunities that may lead to ground-breaking products (El Haiba *et al.*, 2017). Utilizing AI tools can help in this process by facilitating a rapid comprehension of novel concepts and technology. From our findings (See chapter 4.2.2), managers can gather information, learn new subjects quickly, and be able to summarize complex subjects as a result. They can broaden their expertise and find possible areas for innovation. Additionally, AI tools can help with translation and phrase rephrasing, which can be useful when corresponding with global partners and clients and producing more inclusive goods. This may result in expanding market share and improve consumer engagement for the startup. This theme of knowledge acquisition is in line with previous research which states that AI simplifies concept validation by combining vast amounts of real-time insights and research (Füller *et al.*, 2022). Managers in the ideation stage can greatly benefit from the usage of AI technologies for knowledge acquisition by speeding their ideation process, enhancing their knowledge base, and discovering new areas for innovation.

Moreover, from our findings, it has been shown that the user experience can be improved by incorporating AI into product development, which is a critical focus for organizations during the ideation stage. Startups can customize their products to match the unique demands and preferences of their target market by using AI to study and understand client preferences. This is supported by the design thinking framework, stating that design thinking emphasizes the importance of comprehending users' needs (Brown, 2008) to identify both present and future user requirements.

Customers who feel that the product was created with their preferences in mind have a more positive user experience as a result of personalization. These findings are also relevant to the prior literature reviews (Verganti *et al.*, 2020; Füller *et al.*, 2022) on how AI is capable of providing a more human-centered, abductive, and iterative design approach through problem-solving loops by reducing constraints related to scale, scope, and learning, these loops gather and evaluate real-time data from customers and stakeholders, enabling AI to continuously learn from user interactions and produce better creative solutions over time. Further, startups that employ AI to maintain data integrity and thwart potential hacking attempts gain the trust of their customers leading to user satisfaction. As shown from our findings, startups can create personalized and secure solutions that resonate with their target audience and increase user satisfaction and loyalty by maintaining data privacy and security.

Additionally, startups frequently encounter resource limitations throughout the ideation stage. In this regard, applying AI to product development can be advantageous. According to our findings (See Chapter 4.2.4), Several informants emphasize how using AI increases metrics for cost, accuracy, and dependability. Using AI has the ability to boost productivity and lower labour costs by allowing for greater accomplishment with fewer employees. Due to the ability to increase output while lowering costs, this might be especially helpful for startups with limited resources. Many innovative firms can automate tasks, streamline processes, and optimize resource allocation by integrating AI into product development, leading to more effective operations. These findings are in line with previous research (Bughin *et al.*, 2017) that AI facilitates process optimization by identifying areas for improvement in product or service design, leading to better performance and reduced costs. The development process becomes more efficient, cost-effective, and error-free, resulting in a faster rate of innovation. On top of that, AI tools can provide more insightful data, enable companies to make data-driven decisions and spot potential for cost savings.

Lastly, innovation was another theme uncovered from the findings. Innovation is a top priority for startups during the ideation stage, and the use of AI can significantly boost and improve the innovation process. Generating creative ideas is the starting point for any innovation process (Amabile *et al.*, 1996) and our findings emphasize the potential advantages of AI in fostering innovation within startups. A manager mentioned how AI can generate simulations for

development work, allowing employees across the firm to participate in this kind of work. A stronger capacity for innovation results from the faster iteration and experimentation made possible by this enhanced efficiency. Additionally, AI fosters a collaborative and inclusive workplace where new perspectives and ideas may be shared, encouraging creativity across the board by opening up development work to a larger spectrum of employees. Another manager emphasizes how scaling AI is possible, which opens up a lot of options for entrepreneurs (see Chapter 4.2.5). AI frees up significant time and resources that may be reallocated towards activities that are more focused on innovation by automating repetitive and routine chores. This enables companies to concentrate their efforts on discovering novel concepts, creating ground-breaking products, and remaining competitive. The capacity of AI to improve efficiency and streamline processes helps startups scale successfully, enabling expansion and greater room for creativity. AI empowers startups to optimize their resources, and accelerate product development processes, unlocking new possibilities for innovation.

5.3 Prominent Tools within the Ideation Stage of Product Development

Our findings show the different types of AI tools that can be used during the ideation stage of product development. AI tools have a wide range of capabilities that improve the creative process and lead to more efficient product development. Employing AI tools enables startups to improve productivity and automate tedious operations, allowing business owners to concentrate more on producing increasingly inventive products. The identified tools within our findings include language models, such as ChatGPT and Github Copilot, data generators, automatic speech recognition, natural language understanding, and modeling tools. As mentioned in Chapter 2.6, there are a few different tools commonly used in the product development process, namely, natural language processing, computer vision tools, predictive analytics tools, chatbots, and neural networks.

Language models, such as ChatGPT, are widely employed in the product development process. ChatGPT was mentioned in every interview due to its newness and functionalities it possesses. Not to mention, it was relatively easy to use. It offers support in coming up with code concepts and helping to solve coding problems. Managers also emphasized ChatGPT's value in utilizing AI to efficiently arrange data for databases' searchability and usability.

Another well-known tool language model that greatly helps developers write code is Github Copilot. By acting as a virtual assistant and offering code snippets in real-time, it speeds up coding and frees developers to concentrate on creating innovative functionality. Github Copilot is preferred by managers due to its benefits in cutting down on coding time and increasing debugging effectiveness.

Data generators facilitate the gathering of data and the creation of test cases, which is an important part of the product development cycle. Small businesses without access to large databases will find these tools very helpful. The value of data generators in simulating data and establishing a functional balance within the company is emphasized by managers.

Another tool that was mentioned was ASR. The transcription of audio waves into text using ASR techniques enables the creation of meeting notes and transcripts in the cases of the managers interviewed. The use of ASR by managers to record meeting speech and convert it to text, enhancing documentation and knowledge retention, is highlighted.

Tools for natural language understanding (NLU) are used to decipher phrase intentions and enable context-based decision-making. NLU is described as being used by managers to analyze text waves to identify emotions, intent, and essential actions. Depending on the determined intent, various logic is then triggered.

Furthermore, avatars and animation sequences can be created using modeling tools, such as those offered by Nvidia. These methods increase the realism of avatars by using AI to mimic human movements, expressions, and speech. Managers are excited about this tool, which emphasizes how files are loaded into the modeling program, which then produces animation sequences.

5.4 The Importance of Context between Firms

Interestingly, our study reveals that opportunities and challenges of AI integrations are intertwined and dependent on the specific context of each firm. Similar to research by Fuller *et al* (2022), the

integration of AI has no one-size-fits-all approach. The opportunity for AI Integration in one firm can be a challenge for another and vice versa. For instance, our findings suggest that cost efficiency in AI tools is not always true. Although literature (Bughin *et al.*, 2017) and several managers from the interview supported the statement (See chapter 4.2.4) that AI tools help optimize their product development process to be more efficient and cost-effective, this is not always the case. As we came to find out, AI requires high resources from the working team such as high-skilled professionals, high-quality data input, and expensive software programs among other complexities. Therefore, instead of increasing cost efficiency and reducing the working timeline, AI implementation in the project can be more expensive than the traditional process.

In addition, we uncovered from the findings that the black box effect from AI, which is usually seen as a limitation for many firms as it reduces transparency to interpreting and troubleshooting errors in the working process, can become an opportunity in the firm that requires the usage of anonymous data within their product. The manager mentioned that this effect actually increases the integrity of the system as it removes the possibility of hacking and increases user experience as it promotes data privacy and security. Therefore, giving them a unique competitive advantage over other firms.

6. Conclusion

6.1 Conclusion

Overall, it can be concluded that there are both significant opportunities as well as challenges in integrating AI/AI tools within the ideation stage of the product development process as previous research has indicated. The road to fully implementing AI within the ideation stage of product development is currently challenged by limitations of contextual awareness in AI, in users, and in data, along with issues of high cost, AI overreliance and ethical concerns. It is important to note that the field of AI is rapidly evolving and the challenges identified today may change in the future. Nonetheless, the challenges identified in this thesis highlight the need for product development teams and other actors to carefully evaluate the risks of AI integrations and address the challenges in order to develop strategies to harness the power of AI to drive innovation.

Despite the challenges, the integration of AI within the ideation stage of the product development process also brings forth opportunities namely, the increase in efficiency, the rapid acquisition of knowledge, enhanced user experience, cost-effectiveness, and heightened innovation. Product development teams within startups can take advantage of AI and the opportunities it presents in order to improve their overall product development process.

There are also several AI tools that play a significant role in the product development process and by utilizing them efficiently, product development teams and managers in startups can reap their benefits and gain a competitive advantage in their respective markets.

The need and purpose for AI varies from startup to startup so it is important for product development teams and managers to be aware of the challenges and address them before implementation. By recognizing and addressing these challenges, startups can harness the power of AI to boost productivity, improve user experiences, and spur innovation while guaranteeing responsible and ethical AI integration. AI will continue to develop at a rapid pace so continued research, development, and collaboration between academia, industry, and policymakers are

essential to navigate the evolving landscape of AI integration and unlock its full potential for product development.

6.2 Contributions

6.2.1 Implications for researchers

The findings of this study have important implications for entrepreneurship researchers. These implications confirm, challenge, or ask for further exploration. Firstly, our findings are consistent with the study by Brynjolfsson and McAfee (2017), which shows that the full deployment of AI is far from perfect due to many challenges and constraints posed by diverse stakeholders. These challenges encompass technological, organizational, regulatory, user-related, market-oriented, and resource-based factors.

On the other hand, our findings support the study conducted by Cockburn, Henderson, and Stern (2018) and Haefner *et al.* (2021) that contend AI has the ability to fundamentally alter the innovation process. AI enables users to gather data at an unprecedented rate, discover issues, and develop new goods and services.

Our findings, however, challenge the claims made by Verganti *et al.* (2020), Fabio *et al.* (2022) amongst others that AI enhances creativity in product development. Our research suggests the exact reverse. We found that an over-reliance on AI tools can result in a lack of innovation and a propensity for homogeneity. For instance, utilizing the same AI technology, like ChatGPT, incites organizations to come up with the same answers, inhibiting the formation of new inventions.

Interestingly, our findings support and refute the idea that AI is cost-effective (Bughin *et al.*, 2017). On the one hand, some managers claimed that implementing AI would save labour costs because it would require fewer personnel. On the other hand, managers emphasized that the actual implementation of AI requires a substantial amount of resources, including highly qualified personnel, high-quality data input, pricey software packages, among other complexities. As a

result, compared to using traditional techniques, implementing AI may result in greater costs. This could be further explored in future studies.

6.2.2 Implications for practitioners

There are three implications for practitioners derived from the findings. These implications illuminate the difficulties, opportunities, and practical insights associated with the application of AI and AI tools during the ideation stage of the product development process and are relevant for members of the product development team within startups, including designers and managers.

First, our findings demonstrate the challenges in incorporating AI and AI tools within the ideation stage of the product development process. Practitioners can learn from these challenges, which will help them foresee and proactively handle future challenges. Practitioners can be better prepared and even avoid these difficulties completely by learning from their experiences.

Second, our findings demonstrate the advantages of utilizing AI and AI tools during the ideation stage of the product development process. This information can be used by practitioners to provide them with a competitive edge in the market. They can improve their ideation process and produce inventive products by utilizing the possibilities of AI.

Finally, our findings demonstrate the variety of AI tools used and their particular applications throughout the ideation stage of the product development process. Practitioners can use this knowledge as a guide to explore the variety of tools available and choose the ones that are best suited for their organizations, especially those who are new to the AI field. Understanding the unique characteristics and advantages of various AI tools enables professionals to make informed decisions and select the tools that align with their specific needs and objectives.

6.2.3 Implications for policymakers

Policymakers play an important role in the future of AI integration in product development. Firstly, regarding the ethical concerns mentioned above, policymakers need to investigate the topic of AI and provide regulations and guidelines to ensure that AI tools are used responsibly and ethically

for the benefit of society as a whole. This includes ensuring data privacy and security, as well as addressing potential biases in AI algorithms.

Secondly, policymakers can spread the knowledge and resources of AI tools to society to help the public gain a better understanding of the evolving technology and protect themselves from the ethical issues surrounding it.

Thirdly, AI technology generates more jobs in the market, and by facilitating and investing in programs that provide education and training for individuals to increase their knowledge of AI, policymakers can equip professionals for the future of the labour market. Companies will be able to overcome challenges of lacking technical skill and thus, foster innovation and growth in their respective communities.

6.4 Limitations and future research

The qualitative research approach was applied in this thesis to emphasize the rich, real-world context (Eisenhart, 1989) which is relevant to progressing technological business landscapes of startups, as it allows the emergence of theory.

As Bell, Bryman and Harley (2019) mentioned, one disadvantage of the qualitative method is that respondents from qualitative interviews are sometimes prone to give over-rationalization answers which can lack reliability and credibility. Thus, all interviews were conducted with two observers to ensure internal reliability.

The authors were aware of the small sample size of participants as well as the regional limitations as we're focusing on only startups in Sweden and the replicability challenge from each unique interview context. However, respondents from across industries were selected to provide more broader and insightful outcomes. Moreover, concerning transparency, this study includes chapters on research methodology.

As the topic of AI is rapidly evolving every day at the time of the study (the year 2022-2023), we also provide recommendations for future research. Firstly, the study could be conducted with larger

sample sizes and wider ranges of industries to provide a more comprehensive and detailed analysis of challenges and opportunities in AI integration. This will help to better understand the nuances and specific needs of different industries and the impact of AI tools within product development.

Moreover, the study can investigate the other stages of design thinking in product development beyond ideation, such as the stage of prototyping and testing. This will increase knowledge of the role of AI throughout the entire product development process.

Lastly, given the high-paced development of AI technology, it is important to continue ongoing research to stay up to date with the latest technology and developments to understand how AI tools can affect the product development process in the future.

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8. Appendix: Interview guidelines

	Questions
1	Could you please provide a brief overview of how your company develops its products or services?
	How comfortable are you with AI tools?
2	Has your company employed any AI tools in the product development process? If so, could you give some examples?
3	What factors influence your decision to develop new products or features using AI tools?
4	Which specific AI tools are currently being utilized in your product development process?
5	What has been your overall experience with using AI tools in the product development process? Can you share any particular successes or challenges?
6	In your experience, how effective have the AI tools been in enhancing the product development process?
7	Could you share an example of a situation where AI tools significantly contributed to the success of a project or the development of a product?
8	Conversely, could you share an example of a situation where AI tools did not meet your expectations or provide the desired outcome?
9	Are there any stages within the product development process where integrating AI tools is not feasible or practical?
10	What are your plans for incorporating AI tools in the future of your company's product development efforts?
11	In your opinion, what are the potential opportunities for using AI in product development?
12	In your opinion, what are the key challenges or limitations of using AI in product development?
13	Is there anything we may have missed or that you would like to add regarding your experiences with AI tools and product development?