

Hybrid Decision-Making in Startups: The Role of AI in Shaping Entrepreneurial Strategy

Author: Dan Selevestru
University of Twente
P.O. Box 217, 7500AE Enschede
The Netherlands

ABSTRACT,

This study investigates how early-stage startups adopt Artificial Intelligence (AI), including Generative AI, in strategic decision-making, focusing on causal, effectual, and hybrid entrepreneurial logics. Through qualitative, semi-structured interviews and supporting survey data, the research identifies four core dimensions shaping AI integration: barriers, enablers, capabilities, and its impact on decision-making approaches. Findings show that while some entrepreneurs rely on structured (causal) or adaptive (effectual) decision-making, the majority adopt a hybrid logic, using AI both for planning and creative exploration. This group appeared best positioned to leverage AI effectively. AI was most useful in areas such as idea validation, market analysis, content generation, and early-stage planning. Based on these results, the study introduces the A.I.D.E. framework - a four-step model (Acknowledgement, Initiation, Deployment, Enhancement) to guide startups in aligning AI use with their strategic needs. AI is positioned not just as a technical tool but as a cognitive enabler. The framework offers theoretical value, mainly expanding on the past research done in entrepreneurial logic, human-AI collaboration and AI impact over early-stage organizational development. Practically, it offers entrepreneurs and other high decision-making stakeholders a step-by-step approach in how and what to do in order to successfully integrate AI tools so that it can enhance their organizational activities and capabilities.

During the preparation of this work, the author used ChatGPT and Elicit in order to support idea generation, help in analyzing academic literature and for enhancing the visuals of the graphs presented in the paper. After using this tool, the author reviewed and edited the content as needed and takes full responsibility for the content of the work.

Graduation Committee members:

First supervisor: Dr. Igors Skute

Second supervisor: Dr. Martin Stienstra

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1. INTRODUCTION

1.1 Entrepreneurial Challenges in VUCA-environment

In today's modern world, entrepreneurship plays a vital role in all areas of life, including economic, technological, societal and other areas. Start-ups and new ventures have a central role in different activities such as job creation, economic growth and expansion, innovating and developing new technologies, disrupting current markets and contributing to high-impact societal and environmental needs (Kriuchkova, Truba, Nyenno, & Leuven, 2021). Notable examples from the last decade include OpenAI, which has significantly advanced the field of artificial intelligence and influenced most sectors starting from education and finishing to software development, as well as Revolut, a fintech startup that disrupted traditional banking by offering digital-first financial services to millions of users globally (OpenAI, n.d.; Revolut, n.d.).

However, despite their critical role in the economy, startups often struggle with internal challenges such as limited financial resources, lack of established market presence, incomplete organizational structures, and insufficient operational processes. These internal limitations, referred to as the "liabilities of newness and smallness", can severely impact on a startup's ability to survive and grow in its early stages (Freeman, Carroll, & Hannan, 1983; Aldrich & Auster, 1986).

These internal issues can further be intensified by external factors, as startups operate within highly volatile, uncertain, complex, and ambiguous (VUCA) environments. These factors increase the risks and make it increasingly difficult for entrepreneurs to predict market trends, secure long-term resources, and respond to competitive pressures (Troise, Corvello, Ghobadian, & O'Regan, 2022). In such unpredictable settings, traditional planning-based approaches, often referred to as causal logic, may fall short. Causal entrepreneurship follows a structured, goal-driven approach, where entrepreneurs set clear objectives and develop step-by-step strategies to achieve them, assuming a relatively stable and predictable environment as a starting point (Sarasvathy, 2001; Chandler et al., 2011).

In contrast to causal logic, effectual entrepreneurship is characterized by flexibility, adaptability, and resource-based decision-making, where entrepreneurs start with available means and focus on co-creating and leveraging emerging opportunities rather than predicting outcomes. This approach is particularly effective in early-stage startups, where high uncertainty is common and success often depends on experimentation, affordable loss, and the ability to adapt quickly to changing conditions (Sarasvathy, 2001; Chandler et al., 2011).

Startups must make high-stakes decisions quickly, despite lacking different resources, such as complete information or experience. This makes strategic responsiveness and agility crucial for long-term competitiveness.

To overcome both internal constraints and external volatility, startups increasingly turn to digital tools and innovation capabilities. Among these, Artificial Intelligence (AI) emerges as a powerful enabler that can support timely and informed

decision-making, even in complex and uncertain conditions. Exploring how AI influences the strategic logic behind entrepreneurial decision-making is thus highly relevant to understanding and improving startup resilience and success.

Building agility through innovation capabilities, digitalization, and relational networks has therefore emerged as a key strategy for sustaining performance and resilience in VUCA conditions (Troise, Corvello, Ghobadian, & O'Regan, 2022).

1.2 AI as Potential Solution

Over the last decades, digital transformation has emerged as a critical strategic imperative for businesses facing increasing pressure from rapid technological advancements and shifting consumer behaviors. As Verhoef et al. (2021) shows, the impact of digitalization is huge over all the characteristics and activities of organizations, including fundamental changes to business models, organizational structures, and strategic capabilities. Technologies such as artificial intelligence (AI), including Generative AI (GenAI), play a pivotal role in enabling firms to adapt to digital competition, enhance agility, and co-create value with customers and partners.

Emerging research and market trends show an increase in use of AI tools, which can act as potentially transformative technologies for startup decision-making. AI tools can support data analysis, market forecasting, operational efficiency, resource allocation, customer segmentation, idea generation, opportunity recognitions & development and even creative content generation (Ahmić & Ahmić Šahović, 2025). Despite its potential, AI adoption among startups remains limited, especially in uncertain business environments. Vincent (2021) highlights that AI performs best where there are enough historical data-rich, stable environments, which is the opposite of what startups often face. This gap limits our understanding of how AI can be effectively integrated into early-stage decision-making.

Much of the research done has been focused on the implementation and impact of AI in large corporations, often overlooking challenges, opportunities for start-ups and solutions for venture entrepreneurs (Chalmers, MacKenzie, & Carter, 2021; Uriarte et al., 2025). This research is also often focused on the general capabilities and potential uses of AI, rather than focusing on its impact and use and strategic alignment within the early development of organizations.

Another important entrepreneur behavior revolves around the decision-making logic involved – causal or effectual reasoning. In the context of causal decision-making approach, AI can be used in planned and structured applications, such as for data forecasting, predictive analytics and risk assessments (Chalmers et al., 2020; Uriarte et al., 2025).

On the other hand, effectual entrepreneurs might use AI in experimentation, such as fast-paced prototyping and iterative learning, which is aligned with their flexible and adaptive way of reasoning and allows for continuous learning and development based on emergent opportunities (Chalmers et al., 2020; Uriarte et al., 2025).

Reymen et al. (2015) has extended the understanding about these two ways of reasoning, specifically focusing on the fact that entrepreneurs frequently alternate or combine causal and effectual decision-making styles during the new venture creation process. This duality is especially valuable in AI-enabled entrepreneurship, since it allows for the structured capabilities of

AI, such as data modeling to combine or complement its adaptive capabilities, such as iterative learning. This allows for the creation and development of hybrid decision-making models that can help start-ups and new-ventures navigate through the uncertainty, which could also represent the most effective way since it allows for flexibility as well as fostering all the capabilities and enhancements that come with AI tools integration.

1.3 Research Question & Objectives

This study aims to examine how adoption of Artificial Intelligence (AI) and its subsets such as Generative AI (GenAI) impacts the decision-making processes of startups and new ventures operating uncertain, dynamic, and resource-constrained environments. While AI technologies have been widely adopted by large organizations for a multitude of activities such as optimizing operations, forecasting, and enhancing customer interactions, their use in early-stage ventures remains underexplored (Chalmers, MacKenzie, & Carter, 2021; Holmström, 2022). Vincent (2021) also questions about the reliability of AI systems, given that startups and new ventures often lack the historical data and structural stability that these systems rely on.

The study seeks to understand the role of AI not only as a potential tool but as a strategic enabler of entrepreneurial success and growth, particularly within its implications and effects over the causal and effectual decision-making logics (Sarasvathy, 2001; Reymen et al., 2015). It seeks to fill the gap between entrepreneurial and technological research, offering insights into how AI and its subsets can be used as a proactive tool in new venture creation, development and success, by answering the following central research question:

How does the adoption of AI tools influence the strategic decision-making approaches of early-stage entrepreneurs in relation to causal, effectual and hybrid logic?

Finally, the study contributes theoretically by examining AI's role through causation and effectuation lenses (Sarasvathy, 2001; Reymen et al., 2015), as well as help future startup stakeholders in selecting the most effective tools and aligning them with their decision-making needs. A framework has been developed (A.I.D.E.) that brings both theoretical contribution for future research purposes, as well as offering a linear and structured pathway of how start-ups and new ventures can strategically implement and integrate AI tools & systems within their organization.

2. THEORETICAL FRAMEWORK

2.1 Entrepreneurial decision-making: Causation vs Effectuation

Entrepreneurial decision-making is commonly understood through two distinct but complementary logics: causation and effectuation (Sarasvathy, 2001). These logics guide how entrepreneurs interpret uncertainty, allocate resources, and

respond to emerging challenges during the venture creation process.

Causal logic is goal-driven. Entrepreneurs using this approach begin with a predefined objective and carefully plan the steps, resources, and strategies required to achieve that goal. It emphasizes predictive tools such as forecasting, market analysis, and return-on-investment evaluations. Causal decision-making assumes a relatively stable environment, where outcomes can be planned and controlled (Sarasvathy, 2001). This logic is closely associated with analytical reasoning and is commonly used in the later phases of startup development when more data and operational clarity are available at hand (Reymen et al., 2015). On the other hand, effectual logic begins with the means at hand: who the entrepreneur is, what they know, and whom they know, and builds on these to explore multiple possible outcomes. Instead of focusing on achieving a set goal, effectual entrepreneurs remain open to emergent opportunities and co-create ventures in collaboration with stakeholders. This approach is iterative, adaptive, and experimentation-driven, making it particularly suitable in highly uncertain and resource-constrained environments typical of early-stage startups (Sarasvathy, 2001; Chandler et al., 2011).

Another key distinction between the two types of logic comes down to their investment processes. While for causal entrepreneurs, who use different risk and predictive analytics such as cash flows, NPVs and others in order to assess the risk and the expected reward of any particular investment, effectual logic has the focus on affordable loss which is described as “prioritizing what can be risked over what can be gained” meaning that entrepreneurs focus on what and how much they can afford to put at risk, irrespective of the potential outcome (Sarasvathy, 2001).

Regarding the outside environment and competition, causal entrepreneurs focus on analyzing the potential competitors, entry barriers of an industry and try to understand how they can position inside the market. Effectual entrepreneurs adopt what's known as the crazy quilt principle which refers to these entrepreneurs' forming partnerships and co-create markets with other players such as competition, suppliers, business partners, etc.

When it comes to the attitude towards surprise, there are several differences as well. Causation seeks to avoid or neutralize any existing or potentially incoming “surprises” which represent any deviations, changes or unexpected circumstances that can impact the initial plan in some way – these are framed as risks that must be mitigated and resolved. Tools like sensitivity analysis and others are used in such regards. Effectual entrepreneurs, who are more open to the risk-taking side, use what's known as the lemonade principle, which revolves around “leveraging contingencies”, which represents viewing surprises as opportunities on which they can build and develop upon (Sarasvathy, 2001).

Further research, such as Reymen et al. (2015), demonstrates that entrepreneurs' decision-making is not exclusive to either logic. Instead, entrepreneurs often alternate between causal and effectual reasoning depending on both the stage of venture development and the level of environmental uncertainty they face. In early stages, when ambiguity is high and goals are loosely defined, effectual reasoning tends to dominate, which allows entrepreneurs to experiment and adapt based on feedback from stakeholders and evolving contexts. As ventures mature and gain more clarity around markets, customers, and operations, causal reasoning becomes more prominent, enabling "structured planning, resource optimization, and performance tracking". Reymen et al. (2015) highlights that this transition is not always linear, meaning that entrepreneurs may return to effectual reasoning even in later stages when encountering unexpected challenges, exploring new markets, or facing disruptive technologies. In essence, his study shows that decision-making has a dynamic nature where the logic used by the new venture creators is continuously adapted based on the context, type of problem and evolving experience of the entrepreneur

The emergence of AI and its subsets like Generative AI (GenAI) in entrepreneurship adds new layers of complexity to decision-making styles, further increasing the complexity in understanding of how causal and effectual logics are applied in practice. Causal entrepreneurs may use AI for structured tasks such as financial forecasting and customer analytics, while effectual entrepreneurs may use AI to support experimentation, rapid prototyping, or real-time market feedback loops (Chalmers et al., 2021).

2.2 Start-up Development Stages

Startup development occurs through four distinct phases (idea -> pre-startup -> startup -> post-startup), each having its own specific set of strategic priorities and decision-making challenges (Clarysse, Moray, 2024).

The new venture creation process begins with the Idea Phase, where entrepreneurs primarily focus on identifying opportunities. During this early stage, entrepreneurs often work in an informal setting, have limited access to resources, reliable information, or established professional networks. Uncertainty is very high at this stage, leading entrepreneurs to predominantly use effectual logic (Saravathy, 2001; Reymen et al., 2015). This means, in order to find potential opportunities, entrepreneurs focus on using the resources immediately available (means-based thinking) rather than setting detailed future goals, which is often seen in causal decision-making. Entrepreneurs often engage in activities such as experimentation, exploratory conversations, and iterative adjustments based on initial feedback.

The next stage, known as the Pre-Startup Phase, involves shaping and developing upon the identified opportunity. Entrepreneurs start by gathering initial resources, create a founding team, work on validation of the business idea, and prepare to formalize the creation of the new venture. Although uncertainty remains high, it begins to decrease slightly as initial feedback or prototypes become available. Reymen et al. (2015) presents that during the pre-startup phase, entrepreneurs start combining and incorporating both the causal and effectual logics. At this stage,

alternating between structured planning and experimentation is often seen, depending on the situation and information available.

Key challenges at this point include obtaining initial funding, building early partnerships, and becoming familiar with different requirements and aspects, such as legal and operational ones.

The Startup Phase involves the official launch of the business and the product or service introduction to the market. Strategic priorities shift towards activities such as customer acquisition, market testing, and managing resources effectively. At this stage, entrepreneurs increasingly rely on causal decision-making. They use collected data and market feedback to create structured business plans, establish growth strategies, etc. Nonetheless, it is emphasized, entrepreneurs continue to switch between causal and effectual decision-making methods based on the level of uncertainty they face (Reymen et al., 2015). One example could be fundraising activities that typically follow structured causal approaches, marketing or product development might still involve experimental approaches and adjustments through trial-and-error.

Finally, the Post-startup Phase has strategic challenges that focus on activities such as growth management, resource scaling, and organizational formalization, where there is stronger reliance on planning and predictive tools. Throughout this lifecycle, uncertainty gradually declines, enabling more traditional practices but still needing constant shifting of decision logics depending on factors such as internal capabilities and external conditions.

2.3 AI & GenAI in Entrepreneurial Decision-making

Artificial Intelligence (AI) refers to the development of computer systems that can perform tasks typically requiring human intelligence, such as recognizing patterns, making decisions, and learning from data (Goodfellow, Bengio, & Courville, 2016). In the context of classification and prediction, AI involves training algorithms on historical data so they can identify categories (classification) or forecast future outcomes (prediction). These systems learn patterns from datasets and apply them to new, unseen data in order to automate decision-making processes in areas such as image recognition, fraud detection and forecasting.

According to IBM Research (2023) Generative AI (Gen AI) refers to a class of artificial intelligence tools that can generate and create new content, such as text, images, audio, code, or synthetic data, by learning patterns and structures from large training datasets. These models, such as large language models (LLMs) rely on deep learning techniques to understand context, generate coherent output, and even perform complex reasoning tasks. Unlike traditional AI, which mainly focuses on classification or prediction, GenAI emphasizes creation, allowing users to interact with machines in natural language and receive contextually relevant and original responses. These capabilities of the tools can enhance activities such as design, software development, and marketing tasks by automating creativity and augmenting human productivity.

The integration of Artificial Intelligence and its subsets, such as Generative AI is increasingly transforming and evolving the entrepreneurial landscape, offering startups tools that can

enhance decision-making, optimize operations, and navigate uncertainty. Across the startup lifecycle, from the idea phase to post-startup one, AI serves both as a strategic resource and an adaptive support system. In the idea and pre-startup stages, AI is used by entrepreneurs in activities such as analyzing market trends, identifying customer pain points, and validating opportunity spaces through analytical methods like data mining and social sentiment analysis (Chalmers et al., 2020; Uriarte et al., 2025).

At the startup stage, entrepreneurs can use AI for ideation, prototyping, and market exploration aligning with effectual decision-making approaches that favor experimentation and iteration. As startups move towards growth and maturity, causal entrepreneurs benefit from AI tools for activities such as financial forecasting, risk analysis, supply chain optimization, and investor reporting, activities that demand structured, data-driven logic (Eyo-Udo et al., 2024).

The use of AI differs based on decision-making logic: causal entrepreneurs employ AI for tasks such as predictive modeling, structured planning, and tracking of performance, while effectual entrepreneurs leverage AI for adaptability, prototyping, and real-time feedback loops to inform strategy dynamically (Chalmers et al., 2020; Uriarte et al., 2025).

However, barriers persist for effective AI adoption, examples being limited AI literacy among startup teams, ethical concerns and transparency over data privacy and restricted access to high-quality training data, particularly for early-stage ventures operating on tight budgets (Eyo-Udo et al., 2024; Uriarte et al., 2025).

3. RESEARCH METHODS

3.1 Research Setting

This study is set within the context of AI and Generative AI (GenAI) adoption in early-stage startups, aiming to explore how these technologies influence entrepreneurial decision-making processes.

Startups, particularly in their early phases, from idea to startup, are characterized by high levels of uncertainty, scarce resources, and limited organizational structure. This uncertainty makes the adoption of AI, at the same time, both highly beneficial and challenging. AI can support different activities such as data analysis, customer discovery, and opportunity recognition, offering decision-making support in ambiguous and dynamic environments (Uriarte et al., 2025; Eyo-Udo et al., 2024).

In developed entrepreneurial ecosystems like that of the Netherlands, the principle of *affordable loss*, central to effectual reasoning, is especially relevant (Sarasvathy, 2001). Here, failing as an entrepreneur is not usually stigmatized, and there are relatively few negative externalities, such as bankruptcy or social exclusion. This encourages experimentation, calculated risk-taking, and iterative learning, aligning well with the available exploratory AI tools. Additionally, with the help of Netherlands' advanced digital economy and AI infrastructure, entrepreneurs are often well-positioned to leverage these technologies to support both causal and effectual decision-making strategies (Sarasvathy, 2001).

However, most empirical studies on AI have focused on larger, resource-rich corporations, creating a research gap around how AI is applied within entrepreneurial ventures and how founders leverage it to enhance decisions during formative stages (Chalmers et al., 2020; Vincent, 2021).

Given this limited empirical base, and the absence of well-established frameworks on how AI is implemented in early-stage entrepreneurial contexts, this study uses established theoretical knowledge of causation and effectuation to better understand how startups are using or implementing AI tools (Sarasvathy, 2001). Within this framework, the emerging use of AI tools in startups represents a novel area where theory is still being built.

Since strong empirical foundations on AI implementation in early-stage ventures are lacking, especially in relation to how entrepreneurs integrate these tools into their strategic thinking, this study takes an exploratory, qualitative approach.

This approach allows for the generating of context-abundant insights into entrepreneurs' real-world experiences with AI adoption - how they perceive, evaluate, and implement AI tools amid uncertainty and risk. By focusing on the intersection of AI adoption and entrepreneurial decision-making, this research aims to contribute to theory development where current understanding remains underdeveloped. As the literature suggests, entrepreneurial decision-making is deeply situational and often influenced by evolving knowledge, stakeholder dynamics, and experimentation, making qualitative methods such as semi-structured interviews particularly suitable for capturing such complexity (Reuber & Fischer, 1997, as cited in Eyo-Udo et al., 2021; Uriarte et al., 2025). Additionally, this type of interview structure helps, because the intersection of AI (and its other derivatives) and entrepreneurial decision-making is still novel, even though long-term studies and research on causation and effectuation already exist.

This approach can provide rich and exhaustive insights into how entrepreneurs apply AI in uncertain, fast-paced environments and supports the development of a practical framework for AI integration

3.2 Sampling Approach

This study adopts a purposeful sampling strategy, selecting participants based on their relevance to the research focus on AI adoption in entrepreneurial decision-making. Specifically, the sample space includes 17 entrepreneurs and top management team members (co-founders, CFOs, CTOs) from startups at various stages of development (Clarysse, Moray, 2024). Another criterion for selection are that the participants must be actively involved in the new-venture development, as well as use AI tools and systems within the organization.

This diversity in the sample space is crucial to understanding how AI influences decision-making differently across the entirety of the startup lifecycle.

To ensure the richness and relevance of insights, the study includes participants from multiple industries, geographical regions and with different sector-specific dynamics (data availability, customer needs) which can significantly influence

AI application and help in supporting the development of a framework that reflects the complexity and diversity of AI adoption in entrepreneurial environments.

On Appendix 1, in accordance with the criteria discussed beforehand, Table 1 presents a summary of the interview participants' role in the firm, the industry that their organization operates in, the country where it is registered or developed, as well as the startup phase they are currently in. Note that it is often challenging to clearly define a specific phase of development a startup is in, as new ventures frequently engage in activities characteristic to different stages simultaneously. This non-linear nature shows that adjacent phases, such as ideation & pre-startup phase may in some cases overlap, complicating the efforts to assign ventures to a singular phase. For the more ambiguous organization, “/” is used to delimitate that they organization does activities from 2 different phases.

3.3 Data Collection

To address the above-stated research question, a qualitative research design is implemented, as the goal is to explore the topic in depth and gather rich insights. The research starts with a literature review to better understand existing knowledge and gaps related to AI and entrepreneurial decision-making.

For primary data, the core method revolves around semi-structured interviews with startup founders and/or other key decision-making contributors. These interviews explore and focus on when, where, and what types of AI tools are being used, and how these tools influence decision-making throughout different phases of the entrepreneurial journey. Prior to the interviews, participants are asked to complete a brief survey designed to assess whether their decision-making approach aligns more with causal, effectual, or hybrid logic. This survey is developed based on the 4 key dimensions outlined in Brettel et al. (2012), which operationalize effectual and causal decision-making logics in the context of entrepreneurial action.

The first dimension “means vs. goals” contrasts the main difference between the entrepreneurial logics - one on leveraging available resources such as skills, knowledge, and networks (effectual logic) with a goal-driven approach where specific outcomes are defined in advance and resources are then acquired accordingly (causal logic).

The second dimension, “affordable loss vs. expected returns”, compares between decision-makers who prioritize minimizing potential downside risks and committing only what they can afford to lose, from those who evaluate options based on projected returns and profitability.

The third dimension, named “partnerships vs. competitive market analysis”, shows the difference between forming early collaborations, securing stakeholder commitments and reducing uncertainty, by relying on structured analysis of market trends and competitors to inform strategy.

Lastly, “preference for acknowledge vs. overcome the unexpected” dimension differentiates those who treat surprises as opportunities for adaptation and innovation, from those who aim to avoid or control deviations in order to maintain alignment with a pre-established plan.

Leveraging these dimensions allows for more tailored and focused discussions during the interviews, particularly in

examining how the use of AI may shift across different modes of thinking and stages of venture development.

The survey was used for validation and triangulation of the interview findings, which can further mitigate bias enhance the depth of the analysis and cross-validate the findings in the interviews (Denzin, 1978).

Important findings within the survey, as seen in the graphs of Appendix 3 “Quantitative Analysis”, suggest that start-ups and new ventures owners and other high-power decision-makers within these organizations use a hybrid approach within their activities across all the above-presented dimensions, meaning there is no consistent preference between the use of causal or effectual logic.

3.4 Data Coding & Analysis

To ensure a rigorous and structured approach to qualitative analysis, this study employs the Gioia Method for data coding and thematic development (Gioia, Corley, & Hamilton, 2013). This method is well-suited for inductive research that seeks to build new theory found through real-world experiences, aligning it with the semi-structured interviews used for exploring the area of AI-driven decision-making in startups.

The process begins with first-order coding, where the subjects' terms and perspectives are saved through open coding of interview transcripts. This is followed by identifying and underlying second-order themes, and linking them to existing theoretical constructs such as causation, effectuation, and AI adoption behavior. Throughout this iterative process, emerging insights are constantly compared and refined.

The final step in the analysis is to group the main themes into broader, more abstract categories called aggregate dimensions. These are created by combining related ideas that emerged from the interviews, helping to reveal bigger patterns in how entrepreneurs think and act. These high-level categories are then be used to build a practical framework that explains how startup founders use AI in their decision-making. This framework will show how entrepreneurs, depending on their decision-making approach, interact with AI tools at different stages of their startup and how their thinking may shift between causal and flexible effectual approaches (Sarasvathy, 2001).

4. RESULTS

This chapter presents the findings from the study examining how early-stage entrepreneurs incorporate artificial intelligence (AI) tools into their strategic and operational decision-making processes. Using the Gioia method for analyzing of interview data, the produced result shows multiple first-order codes, which were grouped into broader second-order themes (Gioia, Corley, & Hamilton, 2013). These themes were subsequently categorized into four overarching dimensions: AI Barriers, AI Enablers, AI Capabilities, and AI's Influence on Strategic Decision-Making Logic and can be visualized on Appendix 2 “ Gioia 1st order codes, 2nd order themes and aggregate dimensions”.

The results provide the view of how AI is being adopted in entrepreneurial contexts and settings. Participants identified various organizational, technical, and cognitive barriers,

including issues like ambiguous prompts, legal uncertainties, and limitations in strategic application. On the other hand, several enablers were highlighted, such as having AI-knowledgeable team members, affordability of (some) AI tools and the alignment of these tools with business objectives.

Regarding capabilities, entrepreneurs recognized AI's value in automating routine tasks, detecting hidden patterns, and generating content or code. Additionally, the research focuses and demonstrates how AI is able to influence, aid and enhance entrepreneurial decision-making capabilities like AI supporting idea generation, providing alternative viewpoints, and helping maintain strategic focus during early planning stages.

The following sections will focus on each aggregate dimension, exploring how entrepreneurs interpret and navigate AI's opportunities, constraints, and impacts within their venture-development processes.

4.1 Enablers of AI Use & Integration

This section discusses AI Enablers, factors that can positively impact the integration of AI tools and their use in activities and processes of new ventures.

For early-stage startups with limited financial and human resources, AI tools present a viable substitute for specialized roles or management functions. Participants noted that AI could reduce the need for middle management, flattening the overall organizational structure and fill skill gaps, especially in areas like marketing or coding. Its affordability and scalability make it a cost-efficient solution, particularly when hiring is not feasible.

"It's (AI) good since we don't have someone too good in logo designs (...) also saves money. (ID – 4); It is a cheap and good method for startups. (ID – 7)"

Another key enabler lies in AI's ability to analyze complex data and identify hidden patterns that humans may overlook. With its access to vast knowledge and training data, AI offers entrepreneurs a broader view of market signals, helping them anticipate trends and refine strategic direction. This can enhance the confidence in early decision-making.

"We believe that AI can resolve and find out hidden patterns that the human eye cannot detect. (ID – 2)"

Participants emphasized that educational initiatives can significantly improve AI adoption. Training in skills like prompting or understanding how AI tools operate was seen as essential for using them productively. Bridging knowledge gaps, especially between technical and non-technical team members, increases trust and unlocks the potential of tools like ChatGPT.

"Well, we needed to educate our workers in order to know how to prompt engineer. I personally took a physical course to help me with that. (ID – 5)"

Startups with technically skilled founders or team members benefit from a smoother integration of AI tools. They have a better understanding of how AI works under the hood, which could potentially enhance greater trust and more precise usage, particularly when crafting effective prompts or choosing the right tools for more complex projects.

"We mainly have the technical knowledge on our backs (...) have frequently used it during my studies, so have plenty of experience with it. (ID – 4)"

Beyond skills and cost, several organizational conditions were seen as essential for AI to take root. These included hiring digitally literate team members, selecting AI tools that align with specific business goals, and ensuring compliance with privacy regulations. Some startups deliberately avoided tools that conflicted with their values or legal obligations, reinforcing the idea that responsible adoption depends on internal organizational governance.

"We also needed to know the terms of conditions of using such (AI) tools. (ID – 5); Hire modern people with basic knowledge of how AI and prompting works. Most young people use it everyday for us and know how it works. (ID – 7)"

4.2 Barriers of AI Use & Integration

While AI holds significant promise for early-stage startups, many participants expressed caution or concern regarding its practical use. The findings reveal a variety of barriers that prevent effective AI adoption, which range from technical shortcomings and trust issues to legal restrictions and various organizational conditions. Frequently organizations are affected by multiple barriers at once, limiting how and when AI tools are integrated into strategic and operational workflows.

Several participants cited fundamental technical weaknesses of current AI tools, especially in high-stakes or creative tasks. Hallucinations, inconsistent output quality, and an inability to handle nuanced contexts led to distrust in AI-generated results. These limitations constrained AI's usefulness in domains where accuracy, originality, or context-awareness were critical.

"(...) but I don't think it has been implemented well yet - GenAI like GPT still hallucinates. (...) it generates weird things. And what AI generates is quite bland. (ID - 1)"

Beyond technical limitations, many respondents noted that AI struggled in complex or dynamic environments, especially when decisions required more in-depth judgment or coordination. Issues such as inconsistent performance, overdependence on prompt quality, or misuse made AI less reliable in nuanced tasks, as an example for development and design of very complex software systems.

"Sometimes AI does good things, but if you do something wrong, it becomes stuck - which makes the work take more than beforehand. (ID- 1)"

A couple of startups described not needing AI yet, simply because their operations or decisions were still relatively simple. In these cases, manual or basic tools, such as Excel, survey tools, etc. were preferred for clarity and speed. This can suggest that organizational maturity and task complexity play a key role in determining when AI becomes useful.

"At the moment it doesn't seem viable or useful for me. (ID – 1); we make a decision and follow it, but so far it was quite easy, since we are still at a starting phase (ID – 4)"

Legal constraints and privacy concerns also emerged as strong barriers. Startups working with sensitive data often avoided AI entirely to avoid violating client confidentiality or platform data policies. Fear of breaching regulations such as GDPR or similar standards could limit the use of AI in many core functions.

"We don't put sensitive data, in order not to send the data to the organizations hosting these tools (ID – 1); We can't when we work with the client data rely that much on AI. (ID – 7)"

Even when AI was technically capable, several participants expressed skepticism or discomfort with relying on it. AI was perceived as overly agreeable, impersonal, or unreliable in judgment-heavy tasks. Such perceptions reduced trust, particularly in tasks where human experience and intuition were still highly valued.

"I'm very much an AI-skeptic. I don't like that AI, because it always agrees with you. (ID - 1)"

Finally, a couple respondents pointed to internal organizational challenges such as skill gaps, lack of clarity around prompting, or organizational dependence on AI several tools. Misalignment between technical and non-technical team members also could interfere with the adoption. Additionally, high costs of enterprise-level AI tools, such as the ones offered by OpenAI, make it impossible for starting ventures to integrate into their processes, because of frequent lack of capital.

"I think the disconnect between technical people and business people about what AI can and can't do exists. (ID – 1); I do not have access to fancy version of ChatGPT for Enterprise. (ID – 9)"

4.3 AI Capabilities

This section presents the core functions and strengths of AI tools as described by early-stage entrepreneurs. Unlike enablers or barriers, capabilities reflect what AI tools are actually able to do when effectively used. These functional strengths enable AI to directly support decision-making, enhance productivity, and automate key tasks in startup environments.

Some entrepreneurs described AI as a powerful analytical tool, particularly in processing large amounts of data and generating insights. This included the use of AI for analyzing financial data, monitoring KPIs (both internally and of competition), and supporting future-oriented decision-making.

"We also have a financial AI manager which has access to the data (...) and helps analyze the financial KPIs of the company, it's all automated. (ID – 5)"

AI was also appreciated for its ability to identify trends and support forecasting, making it a valuable tool for early-stage strategic planning.

"We want to feed that to some AI analysis tool that can give us some insights from it (...) and even do some prediction into what are going to be the next outputs (ID – 2)"

Participants working in complex environments and industries noted the usefulness of AI in legal research and regulatory navigation. GenAI tools were able to retrieve and synthesize laws, guidelines, and municipality-specific regulations. This allowed startups to reduce their reliance on legal consultants for basic compliance tasks and gain clarity during activities such as market entry planning. This shows that these tools are able to lower entry barriers of organizations, mitigating the knowledge gaps that could have previously been a serious constraint.

"(...) we looked at what regulations there were here. We used GenAI to ask what regulation there were here. (ID - 2)"

AI's creative and strategic potential was particularly visible in marketing use cases. Majority of respondents described using AI for a number of activities such as content generation, advertising

strategy, competitor research, and even for validating marketing directions. Additionally, AI also helped with automating communication flows, such as writing newsletters or sequencing marketing emails freeing up time and ensuring consistency.

"For marketing things, we use it sometimes for generating content. (ID – 1); It can generate really great texts, images, videos, help you with marketing strategy. (ID – 10)"

AI tools were frequently used to enhance daily operations and reduce manual effort. Participants described how AI helped catch mistakes, structure code, and automate repetitive tasks. Some respondents also highlighted AI's ability to augment existing skills, improving the speed and accuracy of creative or technical work, which allowed the participants to focus on more impactful tasks and lower the time needed for the easier and less important ones.

"(...) because (of AI) they finished their jobs a lot quicker than couple years ago. So, it's a lot better workflow. (ID – 13); AI helps in enhancing the quality and speed of programming... (ID – 4)"

4.4 AI Impact on Strategic Decision-making

The final dimension of the findings focuses on how AI influences the way early-stage entrepreneurs' approach strategic decisions. Rather than functioning as an autonomous decision-maker, AI tools are used to enhance and help in human thinking, improve planning efficiency, and expand the range of ideas considered. This dimension reflects both cognitive and procedural shifts, showing how AI alters the structure, speed, and framing of decisions.

AI plays a critical role in supporting information gathering, helping entrepreneurs gather relevant articles, data points, and contextual information for strategic analysis. Many participants mentioned using GenAI tools like ChatGPT and DeepSeek to save time on finding related research and gain initial clarity during early-stage investigations. This ability to summarize or retrieve scientific and business information helped startups make more informed decisions faster, especially when resources were limited.

"What AI thinks about it in a way of comparing your sources potentially also scientific articles. We also look for scientific articles and other tests that have been done through many AI as it is more targeted, and we get first, glance added. (ID – 2)"

Several respondents used AI as a forecasting tool, particularly to anticipate future demand or test assumptions about market trends. In combination with human judgement and experience, AI was seen as a valuable supplementary input during strategic planning. This reflects AI's role in supporting causal logic, where decisions are made with reference to known or projected outcomes.

"I think AI could be a very good tool for forecasting demand over the next few years, as it has a much vaster knowledge than we do. And that could be really helpful in predicting the future trends and see how we could adopt to it.(ID – 3)"

A couple of entrepreneurs also described using AI for creative exploration and early-stage ideation. GenAI was often used to challenge assumptions, generate new business ideas, or explore alternative angles, which would support the effectual logic used by them. AI was able to serve as a kind of "sparring partner", helping validate, challenge or expand entrepreneurial thinking during the idea development phase.

“A lot of times, I use AI to challenge the ideas, also just to think with whether it's nice idea or not. (ID – 11)”

AI, specifically GenAI tools, have also been praised for increasing the speed and clarity of decision-making. Participants said AI helped simplify complex issues, structure short-term plans, and suggest project timelines. Here, AI influenced effectual and hybrid logics, enabling quicker iterations or MVP planning without the use of simply analysis alone.

“We also used it to help us with planning and development of MVP and to design how to structure the development in next 2 weeks. (ID – 4)”

Finally, some respondents emphasized that AI was rarely trusted fully or used in isolation. Strategic decisions remained human-led, with AI serving as a supporting input and tool rather than a decision authority: This selective approach reflects a hybrid model of “human-AI” decision-making, one that combines data-driven insight the AI tools can foster with personal judgment, experience and situational awareness of the entrepreneur.

“I would say we use our intuition, common sense, and we filter through their decisions. (...) for example, in the case of planning, I ask GPT again (...) and he shows me the timeline and I can think of myself if this is doable or not. (ID – 4)”

5. DISCUSSION

This study set out to answer the research question:

“How does the adoption of AI tools influence the strategic decision-making approaches of early-stage entrepreneurs in relation to causal, effectual, and hybrid logic?”

To address this, the study investigated how Artificial Intelligence, particularly Generative AI (GenAI), influences strategic decision-making in early-stage startups. Drawing on semi-structured interviews and relevant secondary sources, the findings show that most entrepreneurs do not strictly follow either causal or effectual logic, but instead apply a hybrid decision-making approach, adapting based on the nature, context and complexity of each task (Sarasvathy, 2001; Chandler 2011). This supports previous research suggesting that entrepreneurs often combine or alternate between the two types of thinking, especially under uncertainty (Reymen et al., 2015). Based on the results of the study, founders used AI tools to support both planning, analytical decision-making and iterative, exploratory activities, suggesting that AI plays a major role in enabling and enhancing the hybridization of decision-making logics.

In line with Brettel et al.'s (2012) four dimensions, which were used as building blocks for the survey, it was found that entrepreneurs used AI in a way that allowed them to switch between decision modes (Appendix 3). For example, some respondents used AI tools like GenAI to generate and iterate through new product concepts, organizational strategies, real-time feedback (effectuation activities), while also relying on predictive analytics and AI-assisted performance tracking (causation activities). This duality reflects how AI is able to lower the barriers between decision logics by offering immediate access to both structured data and creative generation capabilities (Chalmers, MacKenzie & Carter, 2021; Sjödin et al., 2021).

A particularly important finding is the widespread GenAI skepticism among technically minded founders. Contrary to the

assumption that technical capability leads to higher adoption, (considering these capabilities represent an important enabler in AI adoption), participants with strong coding, previous experience in AI tools usage and technical backgrounds tended to approach AI, and especially GenAI tools like ChatGPT, Gemini, with greater caution. These individuals were more aware of model limitations, such as hallucinations, lack of transparency, and data security risks. As a result, they were more likely to limit AI use to non-critical tasks and insisted on retaining human oversight in decision-making (Vincent, 2021). This observation challenges the expectation within effectuation theory that broader means, which would include technical expertise in this case, naturally lead to more experimental behaviour (Sarasvathy, 2001; Brettel et al., 2012).

Another recurring topic was the role of external enablers and barriers. Some entrepreneurs felt a growing urgency to adopt AI due to the rapid pace of competitor experimentation, the fear of their product becoming obsolete, and the integration of AI across adjacent tools and platforms (Troise et al., 2022). However, several adoption blockers were also present. These included uncertainty about ethical and legal boundaries, lack of internal AI literacy, and limited resources for experimentation, especially in firms where decision-makers feared risks such as of operational and strategic nature (Ahmić & Ahmić Šahović, 2025; Uriarte et al., 2025). On the other hand, several enablers, such as increasing accessibility and affordability of some AI tools, the flexibility and adaptability of use (dynamic capabilities) helped entrepreneurs in enhancing their workflow and solve tasks that usually would be associated with more costs. Several start-ups were able to use AI for their marketing purposes, legal advice guidance, consultant for their product and other real-time feedback activities, which allowed for gathering of valuable information at minimal cost (Chalmers et al., 2020; Uriarte et al., 2025).

Ultimately, these findings show that organizational AI implementation is a complex and context-specific process. Each company must tailor and align its adoption strategy to its unique needs, challenges, and capabilities – but there are still similar patterns and some level of linearity that all of them follow, which is further discussed and presented within the developed A.I.D.E. framework.

5.1 AIDE Framework

As a wrap-up of this study, a four-step theoretical framework for strategic AI use in startups has been developed – nicknamed A.I.D.E. (Acknowledgement, Initiation, Deployment, Enhancement), derived from the theory used in the research, as well as the four dimensions developed during the qualitative analysis (Appendix 4).

The first step – Acknowledgement refers to the idea that starts must understand technical flaws, legal boundaries and assess the organizational readiness in order to see AI tools can be implemented. By doing so, entrepreneurs can avoid misuse that can create additional unnecessary costs and unrealistic expectations.

The Initiation stage represents the step to create enabling conditions within organization. It involves activities such as hiring AI-competent members, aligning AI tools with business needs, educating staff on effective and responsible use and embedding these tools in different organizational workflows.

Next up, the Deployment phase focuses on how AI, after implemented, can function in different areas and functions within the organization, such as using it for analytics, marketing, research, etc.

Lastly, but no less important, the Enhancement phase presents how AI can positively impact the decision-making inside the organization, by supporting activities such as better planning, validating assumption, speeding up core activities.

The purpose of this framework is to allow startups and new ventures to have a second thought and become aware of how and if AI tools can enhance their strategic decisions, ensuring alignment and effectiveness that could further help them improve their business outcomes in the end.

5.2 Theoretical Implications

This study contributes to theory by expanding the understanding of how Artificial Intelligence, including Generative AI tools, shape and interact with entrepreneurial decision-making logics - causation, effectuation, and their hybridization. Drawing on Sarasvathy's (2001) foundational distinction between causal and effectual reasoning, the research reaffirms that early-stage entrepreneurs rarely adhere strictly to one logic. Instead, as emphasized by Reymen et al. (2015), entrepreneurs switch between or blend both approaches depending on uncertainty, resource constraints, and stage of development.

Another theoretical contribution lies in showing how AI serves as a tool that reinforces and enhances hybrid decision-making. Causal logic, which is typically associated with planning, predictive modeling, and structured resource allocation has been supported by AI tools for activities such as data analytics, forecasting, and performance tracking (Chalmers, MacKenzie, & Carter, 2021; Amoako et al., 2021). On the other hand, AI enabled effectual behavior, such as iterative learning, ideation, and affordable experimentation, specifically seen through GenAI tools that offer exploratory feedback and creative input, aligning with effectual principles such as the "affordable loss" and "crazy quilt" strategies (Sarasvathy, 2001; Ahmić & Ahmić Šahović, 2025).

AI is seen not only merely as a functional enabler, but as a cognitive collaborator within the decision-making and taking activities. Entrepreneurs engaged AI not just to automate or predict, but to think with, challenge assumptions, and navigate ambiguity. This supports the idea of AI could be used as a socio-technical partner in strategic decision-making with the role of augmenting and enhancing human judgment (Vincent, 2021).

Another important topic, this study also focuses on assumptions about enablers of AI integration. While prior literature often assumes technical capability drives experimentation, findings here show that technical entrepreneurs were often more cautious in trusting GenAI tools, citing hallucination risks and lack of transparency (Ahmić & Ahmić Šahović, 2025). This behaviour could be seen as going against the link between the available means and effectual logic, challenging some expectations rooted in effectuation theory (Sarasvathy, 2001; Brettel et al., 2012).

5.3 Practical Implications

This research can provide practical guidance for entrepreneurs, investors, and other important organizational stakeholders seeking to harness AI effectively.

One of the key takeaways is that startups must assess their internal readiness, not just the availability of AI tools. This includes having the right skills, structures, and awareness of legal and ethical considerations.

Additionally, it's essential to train teams in prompting and interpreting AI outputs. Many challenges stem from poor input quality or unrealistic expectations, which can be addressed through formal training or by hiring AI-literate team members. Startups should also be strategic in how they apply AI, by being able to simplify and automate its use on data-heavy, repetitive, or creative tasks where it adds the most value, and effectively integrating and managing it for complex decisions that require human nuance.

Finally, the study encourages support for a hybrid decision-making approach, where AI provides insights and supports exploration, but key strategic choices remain in the hands of people, with their knowledge and expertise.

5.4 Limitations

As with all qualitative research, this study has certain limitations.

First, the exclusive reliance on semi-structured interviews and inductive coding raises the possibility of confirmation bias - the tendency of researchers to favour data that reinforces their own expectations. Although triangulation, iterative comparisons and Gioia's structured qualitative analysis method were used to mitigate this risk, the set of enablers, barriers, and capability themes identified here may still be incomplete, leaving room for additional variables - new 1st order codes, 2nd order themes and aggregate dimensions to surface in future work (Gioia, Corley, & Hamilton, 2013).

Additionally, since AI tools and user experience with them are evolving quickly, the insights gathered are time-sensitive, since AI tools constantly develop and become better and easier to use, as well as have more varied applications.

5.5 Future Research Directions

Building on top of this study, future research should further investigate how AI tools can be strategically aligned with different stages of startup development, from early ideation to scaling. The A.I.D.E. framework introduced here offers a practical model for step-based integration, but its generalizability and adaptability must be further researched and tested across various industries, geographies, and organizational types. Further redesign or experimental validation of the framework could enhance its possible future impact and theoretical robustness.

Additionally, future studies could explore how different entrepreneurial profiles or startup maturity levels affect the success of AI implementation. Future research could also further develop on the strategic decision-making processes influenced by AI, especially in hybrid reasoning environments, and how tools like GenAI can be embedded not only in operations but in core strategic activities such as market entry, product development, and funding decisions.

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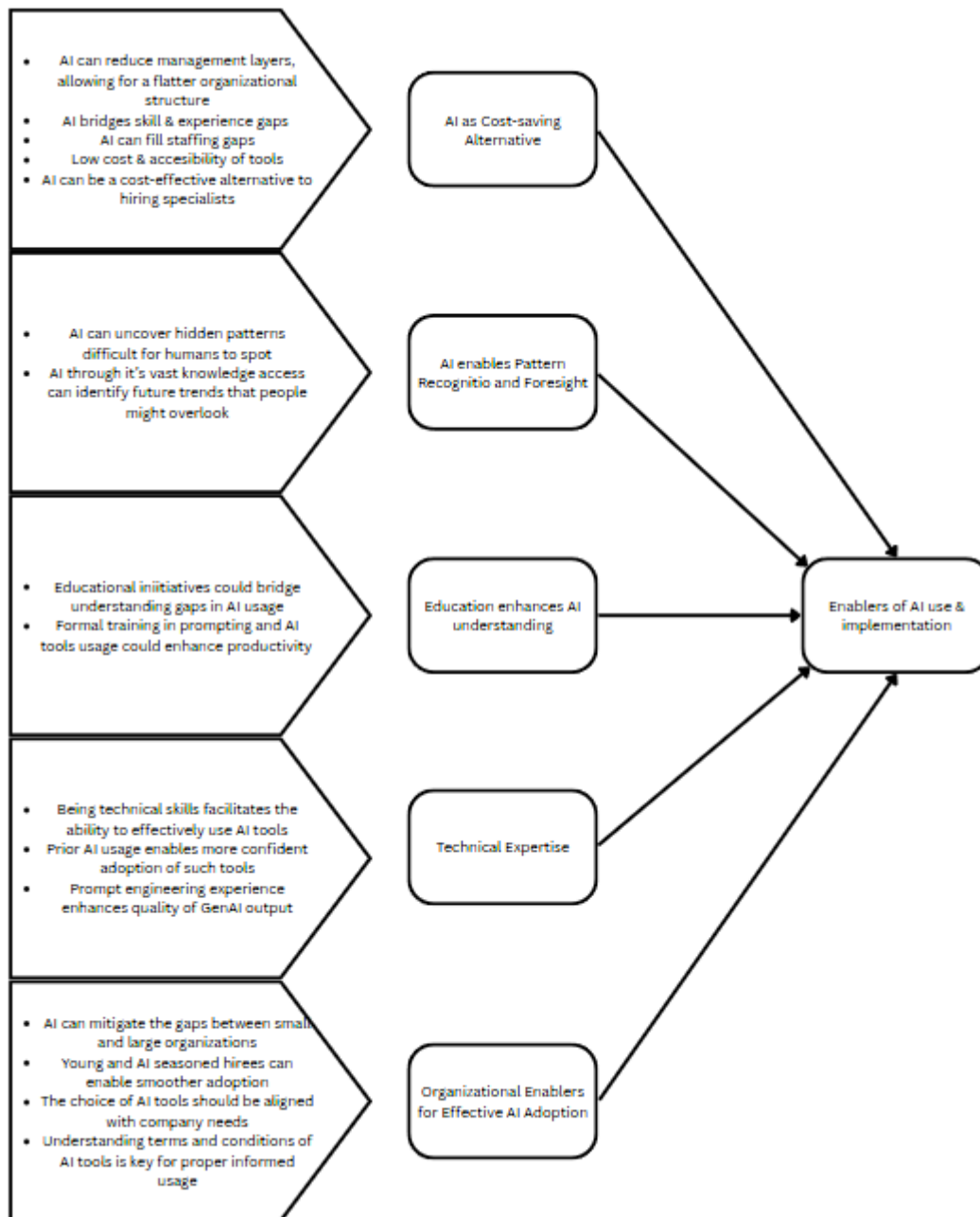
7. APPENDIX

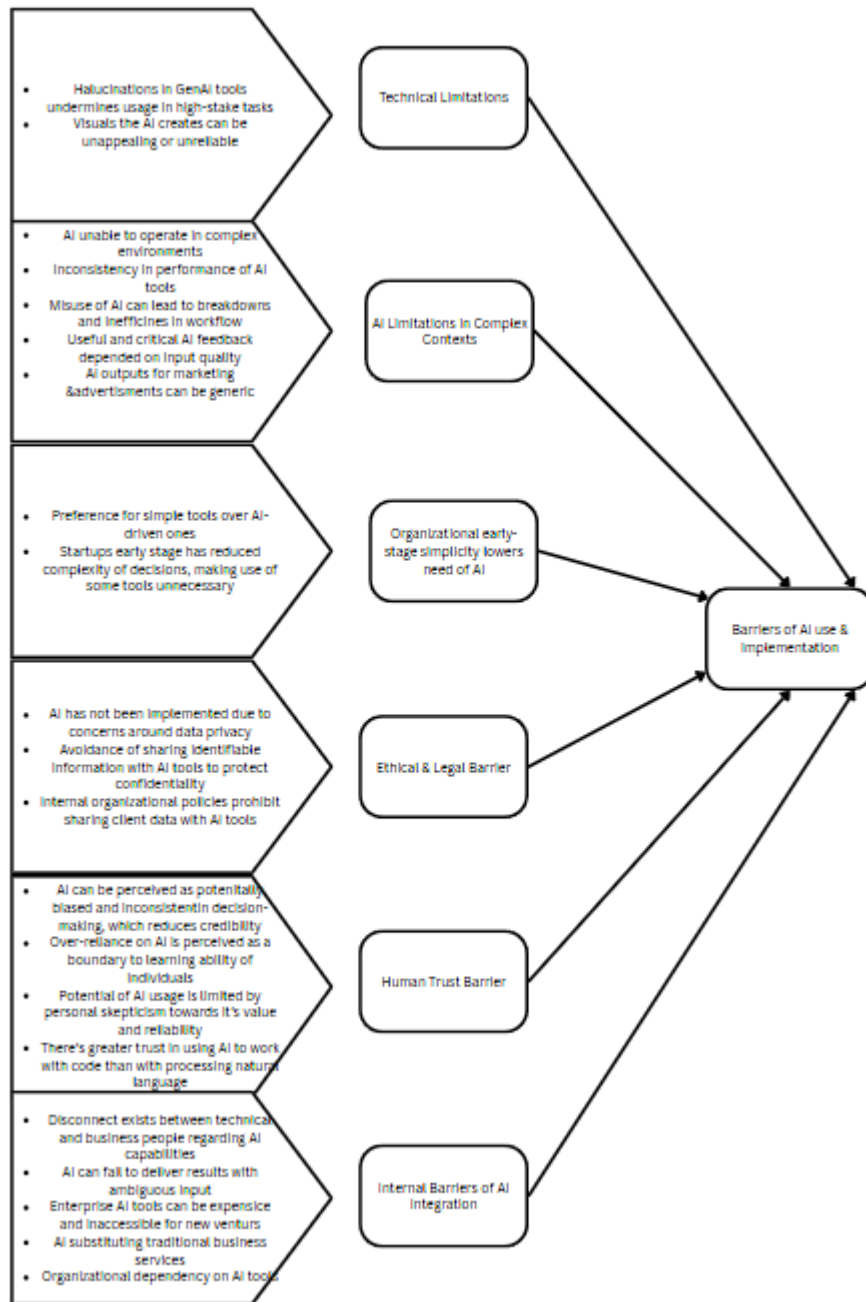
7.1 Respondents Table

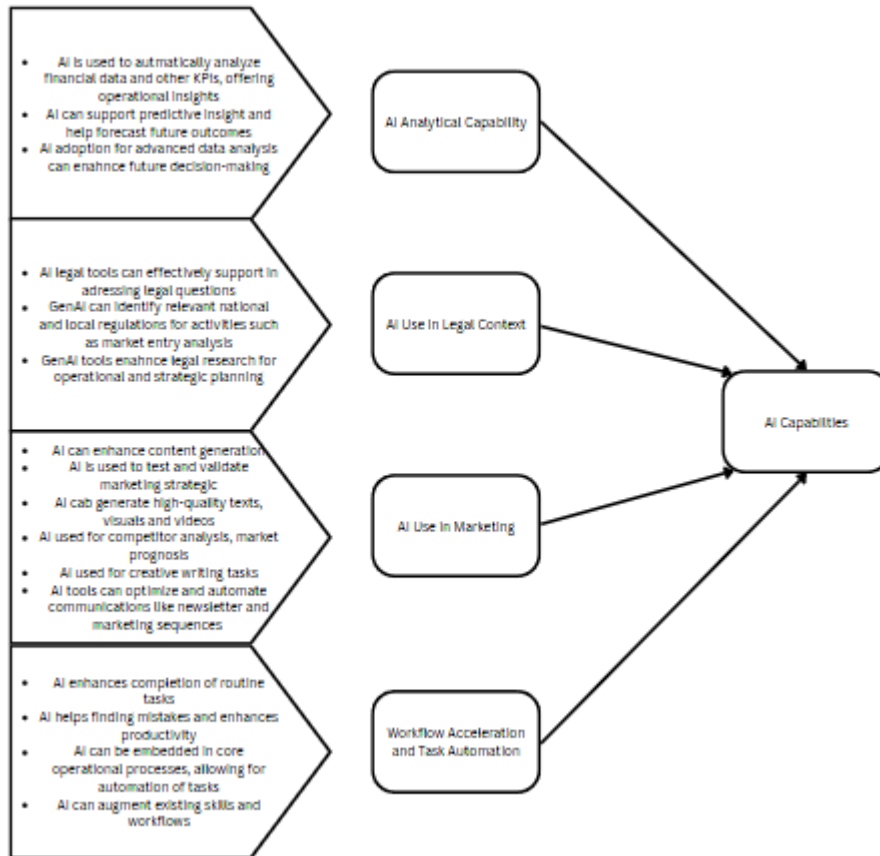
Identifier	Company Role	Organization Industry	Country	Startup phase
ID – 1	Founder, CEO	Data Storage Solutions	Netherlands	Post-startup
ID – 2	Co-founder, CFO	Agriculture	Netherlands	Startup phase
ID – 3	Co-founder, External affairs	Tech-Social app development	Netherlands	Ideation/Pre-startup
ID – 4	Co-founder, Software developer	Tech-Travel app development	Netherlands	Ideation/Pre-startup
ID – 5	Ecosystem growth manager	Crowdfunding	Moldova	Post-startup
ID – 6	Head of Research	Consultancy & Data Services	Germany	Post-startup
ID – 7	Co-founder, Brand manager	Therapy	Slovakia	Pre-startup
ID – 8	Co-founder, CEO, CTO	Tech-Fitness app development	Netherlands	Pre-startup
ID – 9	Co-founder, Global Manager	Agriculture	Greece	Pre-startup
ID – 10	Founder, CEO	Tech-Education tool	Netherlands	Startup phase
ID – 11	Co-founder, Business & Strategy manager	Tech-Trip planner app development	Russia	Ideation/Pre-startup
ID – 12	Co-founder, CEO	Videography, Marketing	Netherlands	Startup phase
ID – 13	Founder, CEO	Marketing	Philippines	Startup phase
ID – 14	Founder, CEO	Business Consultancy, Social media management	Netherlands	Startup phase
ID – 15	Co-founder, Marketing manager	Auto renting	Philippines	Startup phase
ID – 16	Founder, CEO	Hostel renting	Philippines	Post-startup
ID – 17	Founder, CEO	Relocation services	Netherlands	Startup phase

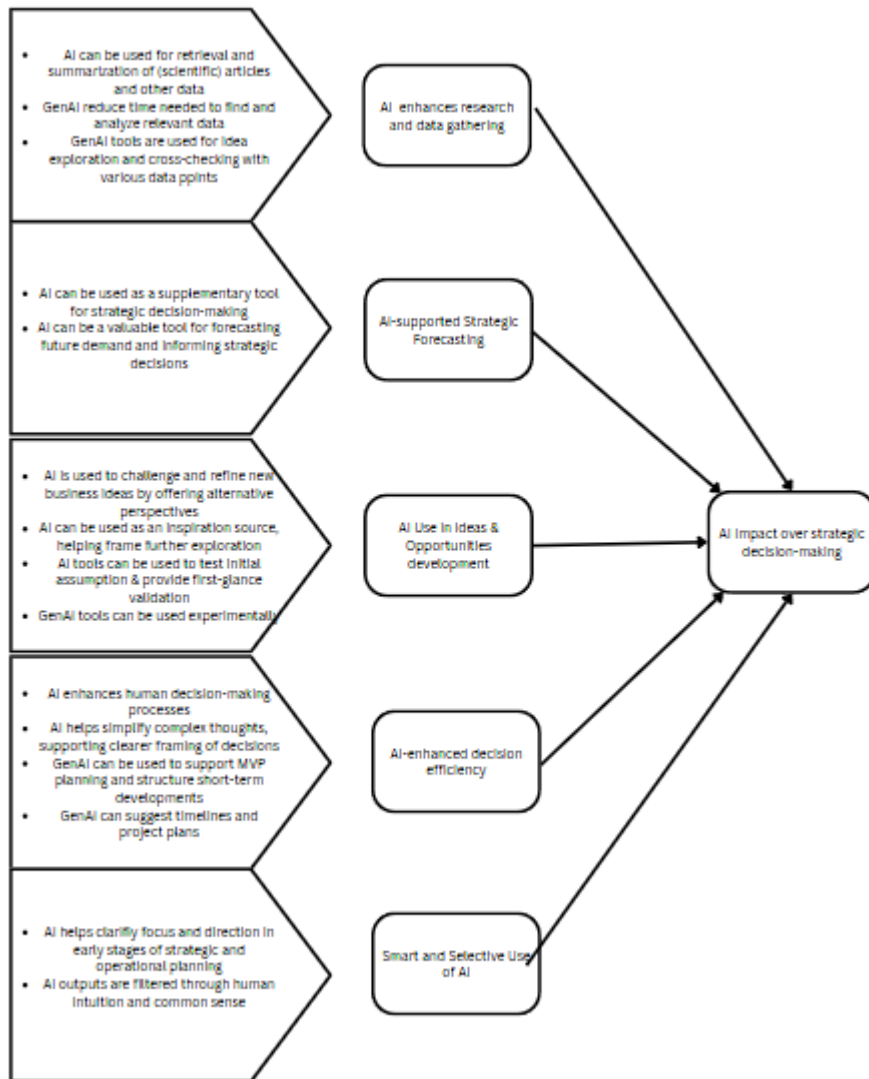
Table 1: Overview of Interview Participants

7.2 Gioia 1st order codes, 2nd order themes and aggregate dimensions

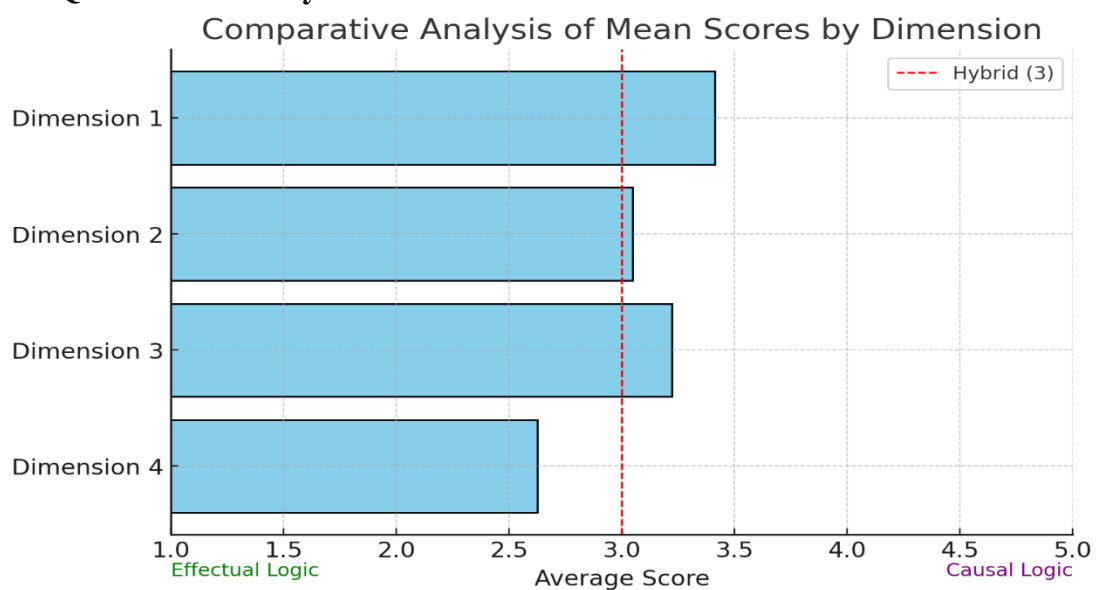




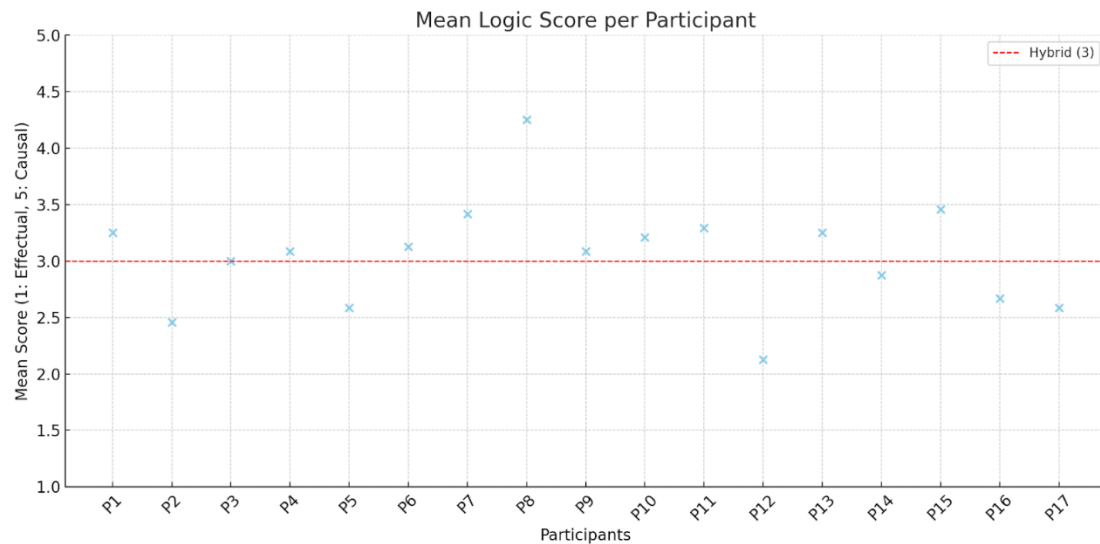




7.3 Quantitative Analysis



Graph 1: Survey mean scores per dimension



Graph 2: Survey mean scores of each participant

7.4 AIDE Framework

