SUSTAINABLE WAYS FOR EARLY-STAGE STARTUPS TO BUILD SCALABLE BUSINESS MODELS LEVERAGING AI IN THE POST-PANDEMIC ERA

by

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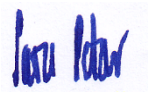

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Dedication

This research is dedicated to all budding entrepreneurs and innovators striving to build resilient and scalable businesses in the new normal. To all those who strive for startup success, may this work contribute to your journey.

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I want to express my sincere gratitude to my mentor, Professor Dr. George Iatridis, for his valuable guidance, constructive feedback, and unwavering support throughout this research endeavor. I thank the SSBM team for facilitating valuable insights and learning resources that have enriched this study. I want to extend special thanks to UpGrad for their excellent learning platform and to Tanvi Naik and Rituja Upadhyay, my research assistants, for their contributions and support in the development of this thesis. Finally, I want to express my gratitude to my family and friends for their unwavering support throughout the completion of this DBA program.

ABSTRACT

SUSTAINABLE WAYS FOR EARLY-STAGE STARTUPS TO BUILD SCALABLE BUSINESS MODELS LEVERAGING AI IN THE POST-PANDEMIC ERA

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2025

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The disruption caused by the COVID-19 pandemic has made it increasingly difficult for early-stage startups to survive, let alone scale. Many of these new ventures have been forced to reevaluate their business models in the face of sudden shifts in the market and widespread uncertainty. In this study, the spotlight is on artificial intelligence (AI) as a potential enabler of sustainable growth. Drawing on primary data collected from 70 startup founders and senior leaders; the research explores both the practical uses and persistent obstacles tied to AI adoption in startup settings. The analysis suggests that the startups that have made the most meaningful progress are those that align their technical efforts with clear strategic objectives and invest in organizational readiness, rather than focusing solely on the technology itself. The study contributes new, actionable insights for entrepreneurs, investors, and policymakers seeking to drive startup growth responsibly and adaptively as the business environment continues to change.

Keywords: artificial intelligence, business model innovation, startups, scalability, sustainability, post-pandemic, entrepreneurship.

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CHAPTER I: INTRODUCTION

1.1 Introduction

Technological evolution has moved at a tremendous speed in the recent years, and the growth of artificial intelligence (AI) since the COVID-19 pandemic has only made that pace quicker. The disruption brought about by the pandemic didn't just highlight weaknesses in established systems. It threw entire industries off balance. For many startups, this meant facing problems they hadn't anticipated. Suddenly, there was an urgent need to develop business models that could withstand shocks and scale quickly (Vázquez-Martínez et al., 2021; Santos et al., 2023). While larger firms struggled to adapt to the so-called "pandemic-born" startups, by their nature, found themselves needing to pivot fast, try new approaches, and lean hard into digital technologies just to survive (Settembre-Blundo et al., 2021; Modgil et al., 2021). Supply chains broke down, and every delay had a domino effect. Costs rose, customer patience wore thin, and companies scrambled to adjust. For early-stage tech startups, these issues landed especially hard. Not only did they have to compete with bigger players and other startups racing to launch digital-first solutions, but they also had to manage the fallout from all sides at once (Li et al., 2020; Santos, Liguori, & Garvey, 2023). In most cases, the only way forward was to adapt in real time, often with minimal margin for error. Founders felt this strain acutely. The usual business hurdles of raising funds or keeping operations afloat were compounded by more personal challenges: running remote teams, staying healthy, and navigating the loneliness that came with limited support networks, especially for those going it alone or coming from underrepresented backgrounds. The impact of these human

factors can't be underestimated; they shaped how startups bounced back and found new ways to solve problems (Settembre-Blundo et al., 2021). Some startups turned chaos into opportunity, rising quickly to "unicorn" status. Hopin, Gong.io, Razorpay, and CureFit are just a few examples. These firms reached billion-dollar valuations by moving fast, staying close to what customers needed most, and embracing digital-first strategies (Kumar et al., 2024). Their rapid growth caught the attention of investors, prompting a renewed focus on agility, innovative use of technology, and the advantages of being able to change direction on short notice. In the years leading up to the pandemic, venture capital poured into leading startup hubs worldwide, with new funding records set and platforms like Y Combinator and Angel List making it easier for founders to get in the game (Kurznack, Schoenmaker, & Schramade, 2021; Liu, 2023; Bonini & Capizzi, 2019). That momentum hit a wall when COVID-19 arrived; investment dried up, early-stage founders found it tough to show traction or even meet backers face-to-face, and risk levels rose across the board (Howell et al., 2020; Salamzadeh & Dana, 2020). Startups that made it through had to be quick on their feet, resilient, and far more inventive than before. There's now much more pressure on entrepreneurs to create value and jobs in ways that are sustainable and ethical, not just about growth for growth's sake (Cueto et al., 2022; Howell et al., 2020; Sipola, Saunila, & Ukko, 2023). In all this, AI has stood out as a real game changer, making it possible for even small or stretched teams to automate processes, offer more personalized services, and reach scale much faster (Rashid & Kausik, 2024; Chen & Islam Biswas, 2021). From my recent survey of 70 founders and executives, the message was clear: AI is widespread, but the actual gains

depend a lot on things like funding, how well AI is built into their top-level business strategy and culture, and the skills on hand. Some companies, such as Bluedot and Pony.ai, leaned on AI to tackle pressing problems during the pandemic, whether it was predicting outbreaks or handling contactless delivery. Recently, larger tech players like Duolingo, Shopify, and Fiverr set the tone for an "AI-first" approach, making AI mandatory in workflows and putting real effort into upskilling their teams (Shibu, 2025). Despite the buzz, most widely used frameworks and digital transformation guides are aimed at big firms or well-funded scale-ups, leaving startup founders with limited resources struggling to find advice that actually fits their situation (Ismail et al., 2014; Benlian et al., 2022). This thesis aims to address that missing link by focusing on what really works for early-stage startups trying to use AI for sustainable growth, drawing from direct founder experiences and cross-industry survey results to highlight what makes the difference, what gets in the way, and where the biggest opportunities lie now.

1.2 Research Problem

Even with all the buzz around AI, most early-stage startups still run into major hurdles when trying to actually put these tools to work. The gap between the promise of AI and the everyday reality is real, especially for those with tight budgets and small teams (Burlea & Mihai, 2019). In my 2025 survey of 70 founders and senior execs, the same issues kept cropping up: not enough capital, trouble finding skilled people, and a lack of infrastructure to roll out and manage advanced technology. Money and skills aren't the only problems, though. Concerns about ethics and bias have become more prevalent since few startups have the systems in place to check their AI for fairness or

accountability (Brevini, 2020). Good, industry-specific data is often hard to get or too expensive, yet it's vital for building reliable AI (Yu, Beam & Kohane, 2018). Many founders also worry about getting locked in with a single vendor, risking their long-term flexibility. Sometimes, expectations run high but reality disappoints: anticipated payoffs don't always materialize, and costly trial-and-error can drain limited resources (Lee et al., 2019). Few startups have the data maturity or change-readiness needed to really get value from AI (Dash et al., 2019). Meanwhile, new rules and regulations around privacy and ethics keep raising the bar, making it even harder for smaller teams that don't have compliance pros on hand (Cheng, Varshney & Liu, 2021). COVID-19 only made this steeper as startups had to speed up digital adoption and rethink their models, even as resources dwindled (Rožman, Oreški & Tominc, 2023). There's still no simple or straightforward roadmap or frameworks for AI in startups; most popular business frameworks (like Exponential Organizations, Ismail et al., 2014) assume a level of maturity and resources that just isn't realistic for new ventures. As Borges et al. (2020) point out, what's needed are tools and strategies built for the actual realities startups face, not just recycled from big-company playbooks. That's where this thesis comes in: by digging into what has worked for real startups, the goal is to fill that gap and offer clear, actionable frameworks for founders, investors, and anyone shaping the future of startup growth in an AI-driven world.

Aspect	Description	Implications
Research Problem	Early-stage startups struggle to implement AI effectively for scalable business models in the post-pandemic environment	High failure rates, wasted resources, missed opportunities for innovation and growth
Theoretical Gap	Limited research on AI implementation in resource-constrained startup environments	Existing frameworks are primarily designed for established organizations with greater resources
Practical Gap	Lack of structured guidance for startups on sustainable AI implementation	Trial-and-error approaches lead to inefficient resource allocation and implementation failures
Academic Significance	Advances the understanding of business model innovation, technology adoption, and entrepreneurship in startup contexts	Establishes AI as an enabler of scalability for early-stage startups
Practical Significance	Provides actionable frameworks for founders and executives; supports more effective AI implementation decisions	Enables better resource allocation and startup resilience
Policy Significance	Informs ecosystem support mechanisms and policy interventions for startup growth	Supports targeted programs for AI-enabled startup development

Table 1.2: Research Problem and Significance. Source: Author, based on literature review and primary research (2025).

1.3 Purpose of Research

The central goal of this research is to figure out how early-stage startups can build business models that actually scale and last, especially now that artificial intelligence is changing the rules after the pandemic. With so many businesses thrown off balance by recent disruptions, this study takes a closer look at what really helps startups succeed for the long haul. The focus is on how AI can improve decision-making, simplify day-to-day management, and help companies connect with customers in smarter ways. By analyzing what's working on the ground, the research aims to shape a practical framework, AI ScaleX, that matches the real-life pressures and opportunities facing startups today. The hope is to turn these findings into clear, helpful advice for founders, investors, and policymakers alike, so they can use AI to make their ventures stronger, more adaptable, and better prepared for whatever comes next. The end result should be a set of frameworks and strategies that the startup founders can actually put to use right away.

1.4 Significance of the Study

This research matters to a wide range of people involved in the startup scene. Founders are trying to grow, investors are looking for new opportunities, and incubators, accelerators, policymakers, and tech partners all play a part in shaping what comes next. What stands out in this study is its focus on practical, hands-on insights about using AI, sustainable business practices, and strategic models that really reflect the challenges of the post-pandemic period. Drawing on the direct experiences of startup leaders, the research digs deep into what it actually takes to bring AI on board, especially for founders dealing with tight budgets, regulatory hurdles, and plenty of uncertainty about

what works. This work adds to the discussion around business model innovation, not just by revisiting well-known ideas (Osterwalder, 2010; Teece, 2010), but by putting a spotlight on the new ways AI is helping startups shape, deliver, and capture value in more nimble and creative ways. The study steps in where earlier research often falls short - most frameworks are built for big companies with deep pockets, but the specific role of AI in giving startups an edge is less well covered. By drilling down into how AI can give even smaller players a leg up, the research helps fill that knowledge gap. There's also a fresh take here on how startups have had to rethink their strategies, business models, and customer offerings during the upheaval of the pandemic (Evans & Bahrami, 2020; Rožman, Oreški & Tominc, 2023). These lessons in flexibility and adaptation, especially using AI as a lever for new growth, offer both theoretical insight and practical advice for anyone dealing with tough times or sudden change. On the topic of sustainability, this study goes further than most by looking at how AI can support not just rapid scaling, but growth that is responsible, ethical, and lasting—a real need that has become clearer in recent years (Sipola, Saunila & Ukko, 2023). AI's ability to help startups balance profits with social and environmental good is a theme that has been running throughout the research. For founders, there is a real-world roadmap here: how to bring in AI, sidestep common pitfalls, and build an organization ready to thrive amid change. The AI ScaleX framework put together for this thesis is intended as an easy-to-follow and flexible roadmap: something founders can actually use day-to-day, not just theory. For investors, the findings help sort out what "AI readiness" actually means, offering clear ways to assess startups' potential and support their development. And for those running

incubators and support programs, the study points to ways they can adapt mentorship and resources to meet the shifting needs of AI-driven ventures.

1.5 Research Purpose and Questions

The overarching theme that guides this study is: **"How can early-stage startups build sustainable and scalable business models by leveraging AI in the post-pandemic era?"** This primary theme is further divided into the following research questions:

Research Question 1 (RQ1): *How can early-stage startup founders effectively lead and implement AI initiatives within their organizations in the post-pandemic era?*

Research Question 2 (RQ2): *What are the key success factors, best practices, and enablers reported by startups that have successfully scaled using AI after COVID-19?*

Research Question 3 (RQ3): *What practical roadmap or framework can guide early-stage startups in scaling responsibly, sustainably, and intelligently with AI?*

Research Question	Research Objective	Measurement Approach
RQ1: How can early-stage startup founders effectively lead and implement AI initiatives within their organizations in the post-pandemic era?	To identify leadership approaches, adoption patterns, and barriers in implementing AI among startup founders.	**Survey** items on founder involvement, leadership actions, decision-making style, AI technologies used, and challenges faced.

RQ2: What are the key success factors, best practices, and strategic enablers reported by startups that have successfully scaled using AI after COVID-19?	To document reported success factors, practices, and enablers in startups that scaled using AI post-pandemic.	**Survey** and open-ended responses on growth drivers, AI impact, scaling priorities, barriers overcome, and best practices.
RQ3: What practical roadmap or framework can guide early-stage startups in scaling responsibly, sustainably, and intelligently with AI?	To propose a practical, evidence-based roadmap/framework for responsible, scalable AI integration in startups.	**Thematic analysis** of qualitative responses, synthesis of survey findings, literature review, and framework validation.

Table 1.5: Research Questions, Objectives, and Measurement Approaches.

Source: Author's formulation (2025)

Diving into these research questions will help us get a clear picture of what's happening right now, the significant challenges and opportunities, and the innovative ways startups can use AI to create strong and adaptable business models after the pandemic.

CHAPTER II: LITERATURE REVIEW

2.1 Theoretical Foundations of Business Model Innovation and Startup Growth

The journey for early-stage startups, especially those navigating the complexities of artificial intelligence and digital transformation, is shaped by a confluence of classic management theory and contemporary mental models. The resource-based view (RBV) has long been a foundation, positing that unique, hard-to-imitate resources, ranging from technological expertise to founder mindset, can form the backbone of competitive advantage (Barney, 1991; Teece, 2018). Yet, in the everyday reality of a startup, simply possessing these resources is seldom enough. The real differentiator lies in how these assets are recombined, adapted, or even reinvented as markets shift and new opportunities (or crises) emerge. The idea of dynamic capabilities (Teece, 2018; Eisenhardt & Martin, 2000) responds to this need for flexibility. This theory is all about sensing changes, seizing opportunities, and reconfiguring what the organization has, sometimes with remarkable speed. In the post-pandemic context, where new technologies like AI emerge rapidly and market demands shift unpredictably, dynamic capabilities can make the difference between a startup that scales and one that stalls (Vial, 2019). In practice, it means that founders need to not only spot trends but also act decisively and adapt processes or partnerships as they go. Adding another layer, systems theory (Katz & Kahn, 1978) encourages us to see startups as open systems, embedded in and constantly interacting with a larger environment of partners, regulators, and shifting industry standards. For AI-driven startups, this means value creation is rarely a solo act; it often depends on a web of data sources, platform alliances, and customer feedback loops

(Gans, Goldfarb & Agrawal, 2021). Value co-creation is an increasingly important theme, reflecting the reality that innovation often emerges through collaboration, sometimes even with competitors. Several entrepreneurship-specific frameworks have become prominent in the last two decades. Effectuation (Sarasvathy, 2001) reframes entrepreneurial decision-making as a process of leveraging what is at hand: skills, contacts, and resources, to shape opportunities, rather than relying solely on predictive planning. Bricolage (Baker & Nelson, 2005) similarly highlights how resource-constrained founders "make do" by creatively recombining whatever is available. Both these approaches resonate strongly with early-stage startups, which are almost always dealing with constraints rather than abundance. Modern business model innovation is also shaped by disruptive innovation theory (Christensen, 1997), which examines how newcomers can upend established players not by directly competing, but by serving overlooked market segments or introducing new ways to deliver value. In the AI context, this might mean leveraging automation or advanced analytics to serve niche markets or create entirely new experiences for users, something not always on the radar of incumbents. Blue Ocean Strategy (Kim & Mauborgne, 2005) adds yet another mental model, urging founders to look beyond crowded markets ("red oceans") and instead seek uncontested spaces where competition is irrelevant. This strategy dovetails with AI-enabled startups that can combine digital tools, data, and novel delivery models to reach new customers or even invent new categories altogether.

Increasingly, founders draw inspiration from first principles thinking, a method championed by figures like Elon Musk, where assumptions are broken down to their most

basic truths and rebuilt from the ground up (Musk, 2013; Agrawal, Gans & Goldfarb, 2018). This kind of reasoning can be especially potent in AI, where the temptation is strong to copy best practices rather than re-examining what the technology actually makes possible. The Exponential Organizations (ExO) framework (Ismail, Malone & van Geest, 2014) encapsulates much of this modern thinking. ExO proposes that startups can achieve extraordinary scale by leveraging assets they don't own (like data, cloud infrastructure, and crowd-based talent), building communities, and using algorithms to automate and accelerate operations. While the potential for exponential growth is appealing, not all early-stage startups can easily access these advantages, especially those outside major tech hubs or lacking venture backing.

No framework is perfect. RBV and dynamic capabilities theories, for example, often assume a degree of slack or time to experiment that many startups simply do not have. Systems theory is helpful for mapping complexity, but can be vague when it comes to action. Disruptive innovation and Blue Ocean offer fresh perspectives, but not always a roadmap for execution under acute uncertainty. Effectuation and bricolage may capture the entrepreneurial spirit, but they sometimes underestimate the structural barriers in tech-intensive fields like AI. Ultimately, what emerges from both classic and contemporary literature is a recognition that successful founders blend these approaches: leveraging resources, building capabilities, questioning assumptions, and forming partnerships, all while staying alert to signals from the market and their ecosystem. The AI ScaleX framework introduced later in this thesis draws on this diverse foundation, aiming to provide a practical synthesis that aligns with the realities facing AI-driven

startups today. Alongside formal academic frameworks, modern startup founders often draw inspiration from practitioner-led mental models. Naval Ravikant, through his essays and interviews compiled in *The Almanack of Naval Ravikant* (Jorgenson, 2020), emphasizes the importance of permissionless leverage, compounding effects, and the pursuit of specific knowledge in building scalable and sustainable ventures. While not formalized as peer-reviewed frameworks, Ravikant's ideas have become highly influential within the entrepreneurial community and frequently inform the strategic thinking of tech founders. Navigating business model innovation and growth now demands a synthesis of established theory and new mental models. Whether through resource leverage, dynamic adaptation, effectual logic, or exponential thinking, startups that manage to balance creativity, discipline, and a willingness to challenge the status quo are those best positioned to scale in today's environment.

Framework / Model	**Key Components**	**Strengths**	**Limitations**	**Applicability to Startups**
Business Model Canvas (Osterwalder & Pigneur, 2010)	Value proposition, customer segments, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, cost structure	Visual simplicity, comprehensive coverage, and widely adopted	Static, less emphasis on external forces	Highly applicable for initial design and pivots
Value Proposition Canvas (Osterwalder et al., 2014)	Customer profile (jobs, pains, gains), value map (products/services, pain relievers, gain creators)	Detailed value analysis, customer-centric, complements BMC	Focused on value proposition, limited scope	Useful for refining product-market fit

Lean Startup Methodology (Ries, 2011)	Build-measure-learn loop, MVP, validated learning, innovation accounting	Experimentation, rapid iteration, and resource efficiency	Less structured, mainly process-oriented	Ideal for high-uncertainty, early-stage startups
Blue Ocean Strategy (Kim & Mauborgne, 2014)	Value innovation, four actions (eliminate, reduce, raise, create), strategy canvas	Market creation, differentiation focus	Complex to implement, requires deep research	Startups seeking uncontested markets
Growth Hacking Framework (Ellis, 2010; Holiday, 2013)	Product-market fit, growth channels, viral loops, retention optimization	Data-driven, growth-focused, resource-efficient	Tactical, can be short-term oriented	Rapid user acquisition for digital startups
Platform Business Model (Zott & Amit, 2017)	Multi-sided markets, network effects, ecosystem governance, value exchange	Scalability, network leverage, ecosystem development	Complex, needs critical mass	Startups building platforms/marketplaces
Effectuation (Sarasvathy, 2001)	Means-driven logic, leveraging contingencies, affordable loss, partnership orientation	Flexibility, opportunity creation, and suits uncertainty	Can lack strategic focus, reactive	Founders facing resource constraints and high unpredictability
Bricolage (Baker & Nelson, 2005)	Making do, combining existing resources, and improvisation	Resourcefulness encourages innovation with constraints	May not scale easily, can limit long-term planning	Bootstrapped startups or those in resource-scarce environments
First Principles Thinking (Musk, 2013; Agrawal et al., 2018)	Break problems into basic elements, challenge assumptions, and rebuild from fundamentals	Fosters radical innovation, avoids incrementalism	Time-intensive, requires deep expertise	Useful for deep tech, AI-driven, or highly

				innovative startups
Exponential Organizations (ExO) (Ismail et al., 2014)	Staff-on-demand, community leverage, algorithms, assets not owned, experimentation culture	Rapid, scalable growth, external resource leverage	May assume resource access, hard for all startups	Tech-driven, platform-oriented startups seeking rapid scale
Disruptive Innovation (Christensen, 1997)	New market creation, targeting overlooked segments, simple/affordable offerings	Can topple incumbents, opens new segments	Uncertain path to profitability, slow market uptake	Startups targeting unserved or underserved niches
Value Co-Creation (Prahalad & Ramaswamy, 2004)	Joint value creation with customers/partners, collaboration, and user feedback loops	Builds engagement, improves fit, and encourages open innovation	Hard to manage at scale, can blur IP ownership	Useful for digital, B2B, and platform startups

Table 2.1: Comparison of Business Model Innovation and Entrepreneurial Frameworks

Source: Author's synthesis based on Osterwalder & Pigneur (2010); Osterwalder et al. (2014); Ries (2011); Kim & Mauborgne (2014); Ellis (2010); Holiday (2013); Zott & Amit (2017); Sarasvathy (2001); Baker & Nelson (2005); Musk (2013); Agrawal et al. (2018); Ismail et al. (2014); Christensen (1997); Prahalad & Ramaswamy (2004).

2.2 Business Model Innovation and Contemporary AI Frameworks

Startups working in fast-changing, tech-driven markets have found that business model innovation matters more than ever. After the COVID-19 disruptions, many founders had to rethink how they operate, since older, fixed frameworks didn't always hold up. This led to a shift toward models that leave room for experimenting, learning from what works or doesn't, and adapting quickly. The Business Model Canvas

(Osterwalder & Pigneur, 2010) is still widely used - it's clear, visual, and helps teams map out the basics like customer segments, value offered, and key tasks. But for startups, especially those working with AI, it can sometimes miss the moving parts. AI products often need frequent updates and responses to real-world input. That's where the Lean Startup method (Ries, 2011) comes in. It encourages teams to start with something small, test it, and learn as they go. This cycle fits well with AI development, where models often improve with more data over time. Another tool is the Value Proposition Canvas (Osterwalder et al., 2014), which gets more specific about customer needs - what they're trying to do, what frustrates them, and what outcomes they care about. Startups using it tend to focus more on solving real problems, not just building features. Some teams also follow ideas from Blue Ocean Strategy (Kim & Mauborgne, 2014), which suggests that instead of competing directly, it's better to find new spaces where no one else is playing yet. In AI, that can mean using new types of data, building smarter automation, or offering insights that didn't exist before.

Meanwhile, the shift towards growth hacking (Ellis, 2010; Holiday, 2013) has changed how startups approach customer acquisition and product scaling. Unlike traditional marketing, which is often slow and resource-intensive, growth hacking emphasizes rapid, data-driven experimentation and the exploitation of digital channels. The emergence of generative AI has accelerated this trend, enabling startups to automate content creation, personalize outreach, and optimize conversion funnels at an unprecedented scale (Cockburn, Henderson & Stern, 2018; Babina et al., 2023).

However, these capabilities can introduce new risks, including unintended consequences related to algorithmic bias, data privacy, and market volatility (Epstein et al., 2023).

Strategic use of AI has led to the rise of newer frameworks that reflect the realities of modern technology adoption. Maturity models from firms like Gartner and McKinsey describe how organizations move from early trials with AI toward full integration across teams and systems (Holmström, 2021; Borges et al., 2020; Ashta & Herrmann, 2021). These models emphasize the importance of strong data infrastructure, leadership support, workforce readiness, and ethical oversight. For early-stage startups, these models act as guides, helping teams scale AI in ways that are both responsible and sustainable (Weber et al., 2021). The AI Canvas (Agrawal, Gans & Goldfarb, 2018) has also gained traction, particularly among startups trying to embed AI into their core business activities. It structures planning around prediction tasks, human input, system actions, and feedback loops, which makes it easier to tie AI efforts to real business problems and ethical goals (Dash et al., 2019; Johnson et al., 2020). Broader shifts tied to digital transformation are reflected in models like the Digital Transformation Framework (Westerman, Bonnet & McAfee, 2014; Warner & Wäger, 2018; Verhoef et al., 2019), which show that meaningful innovation often needs coordinated changes across customer experience, internal operations, and even the business model itself. More recent research highlights how leadership, team culture, and employee involvement are all central when companies try to respond to the new challenges brought about by AI (Zaki, 2019). In practice, startups often do not rely on just one of these frameworks. Founders tend to mix classical business tools with newer AI-focused methods, adjusting as they go and testing

core assumptions along the way. A mindset rooted in first principles thinking, where problems are broken down and rebuilt from scratch, has been widely noted in AI startups (Musk, 2013; Agrawal, Gans & Goldfarb, 2018). As these companies grow, the lines between lean methods, digital change, and responsible AI use begin to blur, requiring a thoughtful, case-by-case approach. The shift in frameworks shows a bigger trend: one that values agility, learning through doing, and using AI not just as a feature, but as a foundation for building long-term value. Startups that manage this well are usually the ones that keep structure where it helps, but stay flexible enough to move fast, make use of their data, and stay aware of both the risks and the possibilities ahead.

Model	Stages/Levels	Key Dimensions	Strengths	Limitations
AI Readiness Framework Holmström (2021)	1. Awareness 2. Active 3. Operational 4. Systematic 5. Transformational	Strategic alignment, data readiness, organizational capability, governance	Comprehensive, business-focused, practical assessment tools	Limited consideration of startup contexts, complex implementation
AI Maturity Assessment Kaplan & Haenlein (2018)	1. Initial 2. Repeatable 3. Defined 4. Managed 5. Optimized	Technology infrastructure, data management, skills & capabilities, governance & ethics	Technical depth, process orientation, industry benchmarking	Oriented toward larger organizations, resource-intensive assessment
AI Implementation Spectrum Borges et al. (2020)	1. Exploratory 2. Tactical 3. Strategic 4. Transformative	Use case selection, technology adoption, organizational integration, value creation	Simplicity, focus on business value, and implementation guidance	Less detailed than other models, limited validation in research

AI Adoption Roadmap Soni et al. (2019)	1. Foundation 2. Experimentation 3. Adoption 4. Intelligence	Data infrastructure, AI capabilities, organizational readiness, business integration	Practical implementation steps, risk management	Descriptive rather than prescriptive, with a limited empirical basis
Industry 4.0 AI Maturity Lee et al. (2019)	1. Monitoring 2. Control 3. Optimization 4. Autonomy	Sensing capabilities, analytics sophistication, decision automation, system integration	Manufacturing focus, operational emphasis, technical detail	Industry-specific, limited applicability to service businesses

Table 2.2: *AI Maturity Models in Existing Literature*

Source: Author's synthesis based on Holmström (2021); Kaplan & Haenlein (2018); Borges et al. (2020); Soni et al. (2019); Lee et al. (2019).

2.3 The Strategic Role of AI in Startup Business Models

AI has become a buzzword in the business world, although for startups, the reality of actually making AI work is considerably more nuanced. Celebratory success stories often get highlighted in the media, but rarely reflect the practical difficulties of implementation, especially when it comes to young companies operating on tight budgets and without the luxury of big-company data archives. As Lee et al. (2019) point out, it is about the vitality for startups to get their data foundations right. The process of gathering, cleaning, and storing reliable data is frequently taken for granted. Many founders often gather late that without solid data hygiene, even the smartest AI models can end up generating more confusion than clarity. In my review of several founder interviews, it has been emphasized how often teams cite messy or missing data as their biggest bottleneck,

and not the algorithms themselves. This is where the rise of cloud infrastructure has quietly changed the game. As Weber et al. (2021) observe, cloud services are particularly transformative for smaller ventures. Suddenly, what would once have required millions in upfront IT investment can now be rented on demand, with AI tools and scalable computing just a few clicks away. That said, the technology alone is never the full answer. Dash et al. (2019) argue, with some justification, that even with the cloud, most startups still lack the rich historical datasets and technical depth of more established firms. This challenge pushes many young teams to get creative: tapping into open-source solutions, pooling data through partnerships, or sometimes just learning to do more with less. But if the technical side is tricky, the human side can be even more complex. It's tempting to think of AI adoption as just a technology project, yet as Kaplan and Haenlein (2018) stress, building AI literacy across the whole organization is vital. When only a handful of "techies" understand what's happening, resistance and misunderstanding often follow. Successful startups seem to do a better job of getting everyone, from marketing to product, from leadership to interns, at least conversant with AI's capabilities and limits. This broader understanding seems to foster collaboration and helps avoid the classic trap of technology for its own sake.

There's also the matter of founder mindset. Bullough and Renko (2013) highlight how much founder psychology: attitudes toward risk, a willingness to learn, and openness to experimentation, shapes the entire trajectory of AI projects. In startups, a single decision can change everything. Teams led by founders who encourage calculated risk-taking and treat failures as experiments to learn from seem to adapt to AI-driven change

more effectively. A particularly interesting development is the growing sense that AI isn't just a back-end tool but increasingly acts as a collaborator or "digital colleague." Larkin (2017) calls this the "intelligent workforce," where AI chips in with suggestions, automates tedious work, and even analyzes meetings so humans can focus on the higher-order problems. In lean startup settings, this model is especially attractive. With limited staff and a thousand tasks to juggle, leveraging AI as a real partner can sometimes spell the difference between stagnation and meaningful growth. However, the organizational environment is changing. As Rožman, Oreški, and Tominc (2023) note, the post-pandemic world has introduced new patterns of remote work, hybrid teams, and shifting cultural expectations. These changes complicate both the promise and the practice of AI adoption. In essence, what worked in 2018 might not be enough in 2025, especially with the pressures and opportunities brought about by global disruptions.

2.4 Recent Literature on AI Integration in Leading Digital Firms

The first quarter of 2025 has seen an unprecedented wave of transparency and urgency regarding the integration of AI in leading technology firms. Notably, the CEOs of Duolingo, Shopify, and Fiverr have publicly communicated a new reality: AI is not only transforming business processes but also redefining job security, performance expectations, and the very nature of value creation within digital-first organizations (Shibu, 2025a; Shibu, 2025b; Paul, 2025; Bulaev, 2025).

At **Duolingo**, CEO Luis von Ahn's internal memo, circulated in late April 2025 and subsequently publicized, declared the company's official shift to an "AI-first"

strategy. Von Ahn outlined how generative AI had enabled Duolingo to launch 148 new language courses within a year, a feat that would previously have required a decade or more of human effort (Shibu, 2025b). The organization moved rapidly to phase out contractor roles that could be automated, prioritizing AI integration in content creation, hiring, and performance reviews. Von Ahn stressed that "Duolingo will remain a company that cares deeply about its employees," promising support for upskilling and creative work, even as automation replaces repetitive tasks. However, the memo was clear: from now on, all hiring would require proof that AI could not do the work, and staff performance would be measured, in part, by their ability to leverage AI effectively (Shibu, 2025b; Bulaev, 2025).

Shopify's CEO, Tobi Lütke, issued a parallel directive in April 2025, describing the firm's own "red queen race", an allusion to the need for relentless adaptation simply to keep pace. Employees were told that "using AI effectively is now a fundamental expectation" at every level of the company (Bulaev, 2025). Before teams could request additional headcount, they had to demonstrate that the work could not be handled by AI tools. Shopify's cultural transformation was reinforced by reskilling initiatives and by making AI proficiency a baseline metric in performance and peer reviews. Lütke's message, like von Ahn's, emphasized that learning is now self-directed and that open sharing of AI-driven successes and failures is mandatory, further blurring the line between technical and non-technical roles.

Fiverr's CEO, Micha Kaufman, provided perhaps the starkest assessment. In an email dated April 7, 2025, and later posted publicly, Kaufman told the company's workforce and freelancer community: "AI is coming for your job. Heck, it's coming for my job too" (Shibu, 2025a; Paul, 2025). His communication, widely reported across tech media, did not sugarcoat the reality - employees and freelancers alike were urged to master AI tools in their domains or face rapid obsolescence. Kaufman's guidance was practical and actionable, advising his staff to become "exceptional talents" by mastering the latest AI solutions (e.g., prompt engineering, domain-specific AI tools), seeking mentorship, and proactively contributing to organizational AI adoption. He explicitly warned: "Your value will decrease before you know what hit you if you don't know how to use generative AI." Fiverr's public statements and educational efforts, as noted by Shibu (2025a), further support the view that platform businesses are increasingly positioning themselves as both AI adopters and enablers, requiring continuous learning and adaptability across their networks.

Academic and industry observers have been quick to analyze this shift. Babina et al. (2023) have shown that generative AI's strategic value is realized not only in efficiency and product innovation but also in its ripple effects on workforce expectations, organizational culture, and leadership priorities. As Cockburn, Henderson, and Stern (2018) and Epstein et al. (2023) caution, the rapid pace of AI-driven change brings with it not just benefits, but also risks: workforce displacement, ethical uncertainty, and the potential for increased pressure on employees to perform at ever-higher levels. What is perhaps most striking about these memos is their candor and their call to action. In each

case, employees are encouraged to experiment with AI, share their learnings openly, and treat the new technology not as a threat but as a multiplier and a partner. As Bulaev (2025) observed, “the safest workers aren’t just the ones using AI, but those truly collaborating with it.” The safest path forward, these leaders suggest, is not resistance or nostalgia for past workflows, but rather an embrace of the “AI-first” mentality, marked by rapid experimentation, skill development, and a willingness to continually adapt. By 2025, lessons from Duolingo, Shopify, and Fiverr show that AI has transformed from a support tool to a key driver of organizational strategy and workforce development. For startups and established companies alike, the imperative is now to build a culture of learning, resilience, and proactive adaptation, where human ingenuity and AI complement, rather than compete with, one another.

Company	**AI Strategy**	**Implementation methods**	**Workforce Implications**	**Strategic Outcomes**
Duolingo	Transition to an "AI-first" approach, integrating AI across operations.	- Phasing out contractors for tasks automatable by AI. - Utilizing AI in hiring and performance evaluations. - Rapid development of	- Reduction in contractor roles. - Emphasis on AI proficiency in performance assessments. - Training programs for existing staff to adapt to AI tools.	- Launched 148 new language courses, doubling offerings. - Increased daily active users by 49%. - Raised 2025 revenue forecast to nearly $1 billion.
Shopify	Mandating AI integration across all business functions.	- Employees are required to utilize AI tools in workflows. - Justification needed for tasks not automated by AI. - Strategic acquisitions to bolster AI	Cultural shift towards AI proficiency as a core competency. - Reskilling initiatives for employees. - Leadership roles filled with AI-	- Enhanced operational efficiency. - Strengthened market position through AI-driven innovations.

		capabilities.	experienced personnel.	
Fiverr	Encouraging freelancers and employees to adopt AI tools proactively.	- CEO's directive emphasizing AI's impact on all job roles. - Development of AI-powered tools for freelancers. - Educational resources for upskilling in AI.	- Emphasis on continuous learning and adaptability. - Support freelancers in integrating AI into their services. - Organizational focus on AI literacy.	- Positioned as a forward-thinking platform in the gig economy. - Expanded service offerings through AI integration.

Table 2.4 Comparative Analysis of AI Integration Strategies in Duolingo, Shopify, and Fiverr. ***Source:*** *Author's Analysis (2025)*

2.5 Post-Pandemic Business Model Adaptation

The COVID-19 pandemic, unlike previous global crises, demanded an almost immediate reimagining of how organizations create and deliver value. For many founders, the uncertainty of 2020 and 2021 left little room for conventional business planning or incremental change. Instead, adaptation became a matter of survival. Ameen et al. (2020) observed that what might once have been gradual digitalization was instead fast-tracked, with organizations of every size and stage racing to adopt new tools and systems. This wave of change, driven as much by necessity as strategy, meant that even early-stage startups, usually the most resource-strapped, found themselves navigating a landscape where agility and digital fluency were indispensable. From the earliest days of the crisis, it became clear that quick pivots made the difference between stagnation and momentum. Research emerging after 2020 documents how startups that were able to move operations online, connect with customers through digital channels, and shift to remote work were far more likely to weather the storm (Rožman, Oreški & Tominc,

2023; Santos, Liguori & Garvey, 2023). These changes did not always unfold according to a master plan. In reality, many founders have recounted how they stumbled through trial and error - testing new business models, making hard calls on product lines, and, when necessary, cutting costs or finding unexpected collaborations. The improvisational nature of this period is reflected in academic studies, which highlight both the challenges and bursts of creativity that defined the pandemic response (Modgil et al., 2021). Hybrid and virtual business models became not just trends but lifelines for many. There was a marked surge in startups experimenting with e-commerce, digital subscriptions, and new ways of packaging value for customers (Liu, 2023; Seetharaman, 2020). The literature captures how, for many early-stage ventures, it was less about following textbook innovation processes and more about staying close to shifting customer needs, relying on digital feedback, and adjusting direction quickly. Founders often describe this phase as one where their teams learned by doing, sometimes making bold bets out of sheer necessity rather than out of a polished strategy deck.

Remote work is another area where practical realities outpaced theory. The swift move to virtual collaboration gave startups access to broader pools of talent and, in many cases, forced them to rethink how culture and innovation happen when people are distributed (Brynjolfsson et al., 2020; Sarker, 2022). Some teams discovered new flexibility, while others struggled with isolation or communication gaps. Still, most agree that these experiences reshaped expectations for both leadership and teamwork, highlighting the value of digital infrastructure and human adaptability side by side. Resilience and flexibility are recurring themes throughout recent studies. Evans and

Bahrami (2020) introduced the concept of "super-flexibility," describing organizations that managed to stay afloat by continually experimenting, learning, and reallocating resources as conditions changed. Sipola, Saunila, and Ukko (2023) further illustrate that for startups, success in this climate often meant thinking beyond immediate survival, building the kind of agility and resourcefulness that could withstand the pandemic and whatever disruption might come next. Here, the literature starts to hone in on the practical realities that founders have faced: technology became an enabler, but so did old-fashioned problem-solving and a willingness to adapt on the fly.

Artificial intelligence is gradually entering this discussion, though its role is still being mapped out in detail. Some recent papers point to the potential of AI to boost resilience, whether by improving forecasting, automating decisions, or helping startups respond to unpredictable shifts (Lee et al., 2019; Dash et al., 2019). However, conversations with founders and ongoing research suggest that access to reliable data, technical skills, and clear ethical guidelines remain barriers for many early-stage companies. Despite these hurdles, it is becoming clear that digital tools, including AI, are increasingly woven into the fabric of new business models, even if not always front and center. Despite all the progress, several questions remain open. Sarker (2022) points out that much of the literature still glosses over the lived experience of founders, how early-stage startups navigated the intersection of digital transformation, remote work, and organizational change. There is also the matter of which adaptations will stick. As Brynjolfsson et al. (2020) and Cheng, Varshney, and Liu (2021) observe, many solutions born out of crisis are now permanent features of the business landscape, raising new

questions about sustainability, equity, and responsible innovation as we move forward. What emerges from the research published since 2020 is a complex, sometimes messy, but ultimately hopeful picture of adaptation. Successful startups that made it in the market are by combining new technology with experimentation, resourcefulness, and a willingness to challenge old assumptions. Therefore, for business model innovation, it will likely depend on founders' ability to keep learning, stay nimble, and weave digital capabilities (AI included) into strategies that are as sustainable as they are scalable.

2.6 Ethical and Sustainability Considerations

Artificial intelligence is becoming more deeply woven into the daily realities of startups; researchers are increasingly facing challenges with the ethical and sustainability questions that this raises. These challenges, once mainly the concern of regulators or global corporations, are now at the forefront for founders who want to build trust, secure investor confidence, and lay the groundwork for long-term resilience. In the contemporary scenario, overlooking ethics or sustainability can mean more than regulatory risk. It can undermine the very legitimacy and growth prospects of a startup.

2.6.1 Ethical Foundations for Responsible AI

Studies have shown that ethics is not something startups can afford to deal with later on, especially when working with AI. Cheng, Varshney, and Liu (2021) point out that fairness, transparency, accountability, privacy, and security need to be part of the process from the very beginning. It is not just about deployment, as it starts earlier, during design and development. Founders who have ignored these things early often find

that it comes back to cause problems later, whether through pressure from regulators, concerns from users, or doubts from partners. Lobschat et al. (2019) argue for what they call an "ethics-by-design" approach. This means putting in checks and safety steps during each phase of the AI journey, rather than trying to fix things after the product is out. For startups, this really matters, since one mistake can put everything at risk. Das and Rad (2020) mention how hard it is for small teams to build proper governance when they are already working with limited time and tight budgets. In many cases, ethics gets pushed aside, not because it is not important, but because there just is not enough space to do it properly. Still, not having legacy systems or big internal hurdles gives startups an edge; they can build things the right way from the start. Askell, Brundage, and Hadfield (2019) believe that younger companies that care about fairness and openness can actually build those values into their work, shaping both the product and the way the team works together. There is a real chance here for startups to stand out by being known for doing AI responsibly. But at the same time, there is still a lot we do not fully understand about how these goals are balanced with the pressure to survive and grow.

2.6.2 Sustainability in Startup Business Models: A Multidimensional View

The way scholars and practitioners talk about sustainability has drastically changed things in recent years. What was once "being green" to the environment now means juggling economic viability, social responsibility, and environmental stewardship all at once. Epstein and Roy (2003) laid out a framework that tied these aspects together, and more recent work has been able to continue where they left off. Sipola, Saunila, and Ukko (2023) state that for startups, this multidimensional view isn't just a prerequisite,

but it can actually become a competitive edge, attracting customers who care about impact and investors who see sustainability as a marker of resilience. It's become more common to see founders chasing funding, courting users, and building partnerships, all with sustainability in mind. Waltersmann et al. (2021) go as far as to say that embedding sustainability into the business model can actually drive growth by improving relationships with stakeholders and unlocking new markets. Schaltegger, Lüdeke-Freund, and Hansen (2016) share a similar view, suggesting that when startups take sustainability seriously, they often end up on new, sometimes surprising, growth trajectories. Still, for all this enthusiasm, the connection between AI and the different facets of sustainability is not well understood. Most frameworks are high-level and conceptual, leaving open the question of whether AI genuinely helps or sometimes hinders progress toward these broader goals.

2.6.3 AI and Economic Sustainability

On the economic front, there's broad agreement in the literature that AI holds enormous promise for startups looking to do more with less. Lee et al. (2019) emphasize how AI can drive efficiency, help teams make better decisions, and squeeze more value out of existing resources. Soni et al. (2019) build on this, arguing that for resource-constrained startups, the ability to automate customer support, predict problems before they arise, and streamline decision-making isn't just convenient - it can be the difference between growth and stagnation. Bruno (2024) takes the discussion further, suggesting that AI isn't just about efficiency. It can enable new business models entirely, reshaping how startups structure their costs, build recurring revenue, and position themselves in the

market. Still, there is a tension at play here. The drive to use AI for rapid gains sometimes bumps up against the need for long-term sustainability, and the literature has only started to scratch the surface of how these trade-offs play out for real startups.

2.6.4 Environmental Sustainability and the Impact of AI

The environmental footprint of AI is getting more attention as the technology scales. Large AI models, especially those involving deep learning, can be energy-intensive, with significant carbon emissions resulting from their training and operation (Buyya, Ilager & Arroba, 2023). For many startups, this introduces a new dilemma: while AI can help them achieve efficiencies and optimize operations, it may also complicate their efforts to be environmentally responsible. Even so, researchers point to opportunities. Waltersmann et al. (2021) document how startups are already using AI for energy management, waste reduction, and monitoring their impact on the environment. Startups often have an edge here, as Sipola, Saunila, and Ukko (2023) observe, because they can build greener solutions from the start, unconstrained by outdated infrastructure or habits. Still, the details of how these environmental ambitions play out in practice remain an open question.

2.6.5 Social Dimensions and Workforce Implications

AI's impact on people and communities is another thread running through the latest research. For startups, where teams are usually small and roles are fluid, the introduction of automation and new technologies can mean dramatic shifts in who does what, and even who stays on the team (Cheng, Varshney & Liu, 2021). Startups may find

themselves walking a tightrope: automation offers speed and efficiency, but may also demand new skills or leave some team members behind. Algorithmic bias and fairness remain pressing concerns. Brevini (2020) highlights how unexamined AI systems can unintentionally deepen existing inequities, whether in hiring, product access, or broader social impact. The upside, as Askell, Brundage, and Hadfield (2019) point out, is that startups that value diversity and ethics from the outset can create more inclusive, equitable technologies. This isn't just a moral stance—it's increasingly recognized as good business, especially in markets where users and regulators alike are watching closely. That said, the literature still offers few case studies or in-depth accounts of how startups actually balance these ideals with the practical realities of launching and scaling AI-enabled products.

2.7 Summary

Looking back over the studies, cases, and frameworks discussed here, it's clear that artificial intelligence now plays a much more central role in shaping what startups can achieve. It is no longer enough to think of AI simply as an add-on for efficiency; for many founders, it is the foundation on which their business logic, their customer relationships, and even their core value proposition are built. The frameworks referenced, from the AI Canvas to ethics-by-design principles, remind us that the challenge is no longer whether to use AI, but how to do so in a way that is coherent, adaptable, and true to the company's purpose. One of the most important aspects of change is the rise of support networks like incubators, accelerators, and partnerships that offer more than just money. More so, these entities are being allies to founders grappling with technical

complexity, ethical dilemmas, and fast-changing regulations. This value is not only in advice or infrastructure, though; it is able to help startups see what they might miss and avoid pitfalls that others have already encountered. Still, even as this landscape matures, the research community points to lingering blind spots. For all the stories of success, there is a surprising lack of detailed, empirical understanding of how startups with limited budgets actually move from idea to scalable AI solution, especially when operating in a world still shaped by pandemic-era disruptions. Another recurring theme is the challenge of making sustainability a reality, not just a buzzword, finding ways to align AI adoption with environmental, social, and long-term economic goals. If anything, this is the area where both academic and practical work will need to go much deeper in the years ahead.

CHAPTER III: METHODOLOGY

3.1 Introduction

Developing the research methodology for this study did not follow a straight or easy path. When I started planning, it quickly became clear that researching startup growth and AI adoption in today's unpredictable world brings a unique set of challenges. There is no simple recipe for matching what is written in theory with what startups actually face. Especially when both the technology and the market keep shifting. As I moved forward, it was obvious that most of the literature was more concerned with established companies, leaving out the reality for newer, resource-strapped startups. That gap made me rethink and adjust my approach, so the methodology here would be genuinely tuned to the everyday messiness and fast pace of early-stage businesses, especially after the pandemic. In putting together this chapter, I found myself constantly weighing different methods and sometimes having to adjust plans mid-way because of new findings or practical issues that cropped up. Rather than glossing over these twists and turns, I believe it's more honest to lay them out. The goal was to let the research questions and the main framework shape every decision about who to include, what data to collect, and how to analyze it. That meant translating tricky concepts like "scalability," "resilience," and "AI adoption" into real, usable questions for people running startups. The structure of this chapter mirrors that back-and-forth process, sometimes revising survey questions, sometimes working around hiccups, and often juggling the trade-offs between depth and breadth in data. Throughout the chapter, I have tried to keep concerns about validity, reliability, and ethics central, not as box-ticking exercises, but as ongoing

checks on the quality of the work. Protecting participant confidentiality and reflecting on the wider impacts of technology on business and society were treated as priorities. Any limitations or assumptions are laid out plainly, as are the boundaries of what this study can and cannot claim to answer. By walking through these steps and sharing some of the thinking behind the choices made, this chapter aims to help not only those reviewing the work now but also anyone who might want to build on it or learn from the process in future research.

3.2 Research Gaps, Rationale, and Approach

The academic conversation around AI in entrepreneurship has grown substantially, yet it is hard to ignore that most studies still pay greater attention to large, established companies than to startups. This bias shows up in the choice of case studies, the frameworks constructed, and even the definitions used for basic concepts like "scalability" or "adoption." Startups, especially those in their earliest years, operate in an environment that can feel unstable from one quarter to the next. Resource limitations are common, and the speed at which conditions can change presents both risk and opportunity. It is rare to see these daily realities fully reflected in the literature. This is more than just a gap in resources or funding. The process by which startups adapt, experiment, and evolve their business models is difficult to capture using tools designed for steady, mature organizations. Many established frameworks gloss over the improvisation and adjustment that characterize startup growth, especially after a global event like the COVID-19 pandemic. Calls to integrate social and environmental goals into business models have become frequent, yet there is a shortage of empirical work

explaining how founders actually attempt this with the limited means available to them. There is also a persistent tendency to treat startups as if they are a homogeneous group. In fact, the range of industries, leadership backgrounds, and market contexts is wide. Two ventures that share the label “startup” might be facing completely different challenges. Recent changes in the market, especially the acceleration of digital transformation and the spread of AI tools, have only increased these differences. Given these circumstances, there is a clear need for research that reflects the real situations faced by early-stage founders. A study of this kind should try to remain as close as possible to the facts on the ground, acknowledging both the pressures and the compromises involved in growth and technology adoption. The approach adopted here tries to honor that complexity. The starting point was deductive, drawing on theories from the literature to structure the research questions and to frame the survey. At the same time, it was important to allow the researcher to respond to the data as it came in. In some cases, patterns emerged that had not been anticipated. This openness is sometimes described as “abductive” reasoning, where the goal is to move between theory and observation in a way that respects the unpredictability of real-life business practice. This combination of established theory and adaptive inquiry is especially important in the current climate. The intention is not just to test what is already known, but also to provide a path for new findings to emerge. In a field where both the technology and the business environment can shift rapidly, this approach may be the only way to ensure that the research remains relevant and useful to those who are actually building companies today.

3.3 Theoretical and Conceptual Framework

The search for an appropriate conceptual foundation for this research led to the consideration of several established and contemporary theories. It's difficult to identify a single framework that fully explains how early-stage startups approach AI-driven growth, especially given the recent disruptions. More often than not, different perspectives end up overlapping, or sometimes even contradicting each other, as the literature itself acknowledges. The resource-based view (Barney, 1991) suggests that a startup's unique resources, such as proprietary technology, exclusive networks, or the founder's reputation and vision, can give it a competitive advantage. However, as Teece (2018) observes, resources alone rarely guarantee long-term survival, especially for ventures operating in rapidly changing markets. This understanding leads to the concept of dynamic capabilities, as described by Teece (2018) and Eisenhardt and Martin (2000). It emphasizes a company’s ability to identify new opportunities and adapt quickly. These theories help, but they do not fully capture the ways startups are embedded in and shaped by their environment. Katz and Kahn (1978) introduced systems theory, which emphasizes the interconnectedness between organizations and the external forces acting on them. Startups, in the real world, are not isolated. They respond to shifting regulations, trends, customer feedback, and even unexpected shocks like the pandemic, all of which shape the directions they can take (Gans, Goldfarb, and Agrawal, 2021). Yet, it is not just classic management theory that informs this research. In the last decade, newer mental models and frameworks have become prominent in both practice and scholarship. First principles thinking, as promoted by Musk (2013), encourages entrepreneurs to

deconstruct challenges into basic components and rebuild solutions from the ground up. In fast-paced industries like tech startups, founders often challenge industry norms, rejecting traditional wisdom in favor of experimentation and fresh ideas. The Exponential Organizations model by Ismail, Malone, and van Geest (2014) points to how digital tools now make it possible for startups to grow at speeds that would have seemed impossible not too long ago. Instead of building everything themselves, startups can scale faster by using things they do not own, like relying on networks, automation, or communities. Alongside this, more practical tools like the Business Model Canvas (Osterwalder and Pigneur, 2010) remain widely used. It helps founders explain key parts of their business, such as how they work with customers or where their revenue comes from. Its simple layout and flexibility have made it popular, especially in early-stage teams. For startups working with AI, the AI Canvas from Agrawal, Gans, and Goldfarb (2018) offers another layer. It helps teams think through how prediction, human judgment, and feedback play a role in building AI systems that are both useful and grounded in actual business needs. These tools have become more relevant as startups move past early experiments and start using AI in a more central way. Other models like the AI Maturity Curve (Holmström, 2021) and digital transformation frameworks (Warner and Wäger, 2018) provide ways to assess how far a company has come in its AI journey. They also stress the role of leadership, team culture, and ongoing learning, all points that were mentioned by several of the founders interviewed in this research. Looking across all of these frameworks, it becomes clear that no single one gives a full picture. The analysis moves between theory and what is happening on the ground, combining resource-based thinking, systems

approaches, and real-world tools that founders are already using. The aim here is to bring these ideas together in a way that makes sense for startups, and that can also be useful for researchers and policymakers trying to understand what works.

3.4 Research Questions, Objectives, and Measurement Approach

Table 3.1 clearly outlines the connection between each research question, its corresponding research goal, measurement method, and specific survey questions.

Research Question (RQ)	**Research Objective**	**Measurement approach & Key Survey items**
RQ1: How can early-stage startup founders effectively lead and implement AI initiatives in the post-pandemic era?	Identify leadership approaches, adoption patterns, and barriers in AI implementation.	- Role (Q4) - AI Strategy (Q10) - Technologies Used (Q11) - Adoption Challenges (Q12) - Productivity Impact (Q18) - Cost Reduction (Q19) - Decision-Making (Q30–Q33)
RQ2: What are the key success factors, best practices, and strategic enablers for startups scaling with AI after COVID-19?	Identify success factors, enablers, and best practices for AI-driven scaling.	- Revenue & Profit Growth (Q13, Q21) - AI Revenue Impact (Q14–Q15) - Efficiency Gains (Q16–Q17) - Market Expansion (Q20) - Competitive Advantage (Q24–Q25) - Strategic Priorities (Q34–Q35, Q51) - Market Trends (Q52) - Success Factors & Decisions (Q53–Q54)
RQ3: What practical roadmap or framework can guide early-stage startups in scaling responsibly, sustainably, and intelligently with AI?	Develop an evidence-based, actionable framework for responsible AI scaling.	- Differentiators (Q47) - USP Changes (Q50) - Priorities (Q51) - Challenges (Q43) - Customer Acquisition (Q41–Q42) - Success Factors, Future Moves, and Additional Insights (Q53, Q55–Q56)

Table 3.1 *Mapping of Research Questions, Objectives, and Survey Instruments.*

Source*: Author's Analysis (2025)*

3.5 Operationalization of Constructs

3.5.1 Turning Theoretical Constructs into Measurable Frameworks

Bringing theoretical ideas into a form that can be studied in the real world is never a straightforward process. It usually begins with working out what the key constructs actually mean in a specific research setting, then figuring out how to observe or measure them in ways that are both practical and meaningful. In this study, the focus was placed on constructs like AI-driven scalability, startup sustainability, and entrepreneurial orientation, each of which carries layers of nuance. These ideas were not treated in isolation. The structure of the survey and the broader empirical design were shaped by the AI ScaleX Framework developed during the course of this research. That framework is built around eight interlinked areas: Psyche, Purpose, People, Process, Platform, Performance, Proposition, and Partnerships. These categories acted as a kind of bridge between the abstract theory and the practical work of gathering data. The goal here was not just to create a clean alignment between model and method, but to reflect something closer to how founders actually think and operate. By anchoring the investigation in this way, the research tries to stay true to both the concepts being explored and the conditions in which startups work.

3.5.2 Significance of Operationalization

Operationalizing these concepts ensures the research is based on measurable data and allows for future studies to be replicated. By clearly defining variables and indicators, this study provides a transparent framework for evaluating how early-stage startups can integrate AI into scalable and sustainable business models. This approach aligns theoretical insights with practical applications, contributing to a deeper

understanding of how entrepreneurial strategies drive innovation in an AI-powered economy.

Construct	Definition	Measurement approach	Key Survey Items
AI Adoption	Integration of AI tools, platforms, or strategies in operations (Vial, 2019)	Multiple choice, Likert scale	Q10, Q11, Q12
Scalability	Startup's ability to efficiently grow customers/revenue (Ismail et al., 2014)	Likert scale, categorical	Q13, Q14, Q51
Resilience	Ability to adapt and recover from disruptions (Vial, 2019)	Multiple choice, open-ended	Q43, Q47, Q53
Leadership	Founder/leader role in AI and strategy (Osterwalder & Pigneur, 2010; ExO)	Multiple choice, Likert scale	Q4, Q30–Q33
Customer Focus	The degree to which business is customer-driven (Ismail et al., 2014)	Categorical, open-ended	Q24–Q25, Q41–Q42, Q53
Innovation	Emphasis on new product/service/process and digital change (Ismail et al., 2014)	Categorical, open-ended	Q16, Q34–Q35, Q52

Table 3.5.2 Operationalization of Key Constructs (Source: Author's operationalization mapping, 2025)

3.6 Population and Sampling

This study is about early-stage startups, specifically the founders, executives, and key decision-makers who are steering the ship. "Early-stage startups" refer to companies in the pre-seed to Series A funding stages or those active for under seven years. This timeframe fits with what's normally considered early-stage in the industry. It highlights the specific challenges and opportunities new companies encounter as they start. The top

decision-makers are targeted rather than everyone in the company since they understand the company's strategy, daily operations, and overall performance best. Their insights are invaluable for understanding how startups adopt AI, adapt their business models, and achieve sustainable growth. The selection of startups from different industries is deliberate. We can gather useful insights across the board and spot trends that show up in multiple contexts in this manner. AI adoption and business models vary greatly by industry. Our approach highlights both shared themes and unique features for each sector.

3.6.1 Sampling Strategy

In this study, we used a mix of purposive and snowball sampling to find and recruit the right participants. Purposive sampling was used to speak with founders and senior decision-makers of early-stage startups focused on AI or digital transformation. This approach gives valuable insights from those well-nuanced in scaling their business models post-pandemic. Snowball sampling was used to recruit more participants by asking our initial contacts to refer others in their network. This is a good strategy for reaching out to hard-to-find groups of entrepreneurs (Noy, 2008). Non-probability sampling can cause selection bias and limit statistical generalizability, but it is key for exploring new trends like AI adoption in startups. The group we are studying is specific and hard to reach through random sampling (Etikan, Musa, & Alkassim, 2016).

3.6.2 Inclusion and Exclusion Criteria

The study targets founders, co-founders, and senior executives at the C-level, Director level, or equivalent positions. Eligible participants are those associated with startups that have been established subsequent to the year 2010. The organizations these

individuals represent should be involved in or considering artificial intelligence or digital transformation initiatives to grow their business models. Exclusion criteria include a range of specific parameters. Firstly, junior employees or individuals lacking strategic decision-making authority are not eligible for participation. Furthermore, organizations that are either not currently operational or not in the startup phase are excluded from consideration. Additionally, firms that do not demonstrate an intention to engage with digital or AI-driven business models are also ineligible.

3.6.3 Sample Size and Characteristics

The target sample size was guided by both practical considerations and existing scholarly recommendations for organizational survey research. Baruch and Holtom (2008) state that response rates for organizational surveys are usually between 20% and 35%. They consider a median sample size of 100 to 150 responses sufficient for exploratory studies. For this research, a total of 70 valid responses were collected, exceeding the minimum threshold for robust descriptive and thematic analysis.

Phase	**Activities**	**Duration**	**Response Rate**
Preparation	- Survey programming - Distribution list compilation - Email template creation	1 week	N/A
Initial Distribution	- Email invitation to 250 startup contacts - Social media announcement - Startup community forum posts	2 weeks	12% (30 responses)
First Follow-up	- Reminder email to non-respondents - Targeted LinkedIn messages	2 weeks	An additional 8% (20 responses)

Phase	Activities	Duration	Response Rate
	- Startup accelerator network outreach		
Second Follow-up	- Final reminder email - Personalized outreach to key contacts - Startup event participation	2 weeks	Additional 5.2% (13 responses)
Data Cleaning	- Response validation - Incomplete response handling - Data formatting and preparation	1 week	Final: 25.2% (63 complete responses)

Table 3.4.3: Data Collection Timeline. (Source: Author's documentation, 2025.)

3.7 Overview of the Research Problem

This research is inspired by how important AI has become in the startup world and the need for business models that can grow and last. Early-stage startups relied on AI for business innovation after the pandemic. AI can improve scalability, efficiency, and decision-making, but integrating it into a sustainable business model is a test of its own(Tariq, Poulin, and Abonamah, 2021). One of the biggest challenges is that many startups just don't have a solid plan for using AI. A lot of organizations find it difficult to set clear, manageable goals and make sure their AI projects align with their core business objectives. This often leads to scattered efforts that do not show results or add any advantage to the situation (Lee et al., 2019; Bruno, 2024). Startups struggle with a lack of skilled workers, insufficient technology, and challenges in managing quality data for AI (Evans-Greenwood, Crooks, and Nuttall, 2023). They must handle data privacy, algorithm bias, and regulations while ensuring their AI strategies are profitable and

environmentally friendly. These challenges highlight a gap in our knowledge - there are insufficient frameworks for early-stage startups to adopt AI sustainably and ethically.

3.8 Data Collection

We collected data using an online survey on Google Forms for its ease of sharing and accessibility for startup founders and executives. We shared the survey link through email, LinkedIn, and targeted startup networks to reach the right audience. Participants received an information sheet and a consent statement before the survey, ensuring we followed all ethical guidelines. We sent weekly reminders to non-respondents, but participation was entirely optional. All responses were kept anonymous and securely stored.

Characteristic	**Category**	**Number**	**Percentage**
Industry	IT/ITES	19	30.2%
	E-commerce	8	12.7%
	Healthcare	6	9.5%
	Financial services	5	7.9%
	Education	6	9.5%
	Manufacturing	4	6.3%
	Professional services	6	9.5%
	Other	9	14.3%
Company Age	Before 2015	10	15.9%
	2015-2017	12	19.0%
	2018-2020	19	30.2%
	2021 or later	22	34.9%

Characteristic	Category	Number	Percentage
Company Size	1-10 employees	38	60.3%
	11-50 employees	11	17.5%
	51-200 employees	7	11.1%
	200+ employees	7	11.1%
Respondent Role	Founder/CEO	42	66.7%
	C-level executive	12	19.0%
	VP/Director	6	9.5%
	Manager	3	4.8%

Table 3.8: Sample Characteristics ***Source:*** *Authors' Analysis (2025)*

3.8.1 Survey Instrument Development

The survey used in this study was developed gradually, through several steps, to make sure it stayed closely connected to the main research questions, the theoretical framework, and the broader goals of the methodology. It started with a plan to generate items based on both the literature review and the framework created during this study. That process led to an initial pool of questions designed to cover each research theme and theoretical area. The first version of the survey included a mix of closed questions, mainly Likert scale and multiple-choice, as well as some open-ended items to bring in more context and qualitative responses. After this first draft was ready, it was reviewed by three different experts: one in entrepreneurship research, another with experience as an AI startup founder, and a third who specializes in survey design. Their comments helped clarify wording, improve focus, and make the survey more balanced overall. Following that review, cognitive interviews were held with five startup founders. This

step was helpful for seeing how the questions came across in real time, how people interpreted them and whether anything felt unclear or awkward. Several revisions were made based on what came up in those conversations. A small pilot was then conducted with ten startup leaders who were not part of the final sample. This gave feedback on things like how long the survey took, whether the order of sections felt logical, and whether the platform worked as intended. Minor adjustments followed. The final version of the survey was divided into six parts. The first section asked for background details - industry, size, year of founding, and the respondent's role. The second explored AI usage: which tools were used, what challenges came up, and how AI affected different parts of the business. The third looked at the startup's business model, both before and after COVID, with questions about value, customers, income streams, and operations. The fourth focused on scale, asking about what helped or held back growth. The fifth moved into sustainability, covering economic, environmental, and social angles, and also asked how AI might support those goals. The last section looked forward, collecting views on where things are headed - in AI, in business models, and in the startup space in general. The questions used a mix of formats, which helped make the survey more well-rounded. Some answers gave structured data that could be compared easily, while others offered insights that added more depth. Taken together, the survey gave a balanced view, one that matched the practical and exploratory aims of this thesis.

3.8.2 Instrumentation

The primary research method used for this thesis was a structured online survey, chosen because it offered a practical way to reach a broad set of startup founders and

decision-makers. The goal was to collect data that speaks directly to the core research questions and themes developed earlier in the study. The survey itself was designed following standard practices in innovation and organizational research, though adapted to reflect the specific focus on AI and startup business models. Different kinds of questions were included to make sure the data would be useful. For example, we used multiple-choice and other basic categorical questions to collect things like founding year, size of the company, industry focus, and the respondent's role in strategy. Likert scale items, using a five-point scale, helped capture attitudes and perceptions; for instance, how much impact AI was seen to have, or how far along companies felt they were in terms of adoption. A score of 1 usually reflected little or no agreement, while 5 indicated full agreement or strong impact. This kind of approach is fairly typical when trying to turn subjective opinions into something that can be studied and compared (DeVellis, 2017). We also added multiple-response items where people could choose more than one answer. This made sense for questions about technologies used or challenges faced, since most startups were doing more than one thing at once. A few open-ended questions were included, too. These gave respondents a chance to talk in their own words about what had worked for them, how they made decisions, and what they expected for the future. The survey wasn't finalized all at once. It went through a few rounds of revision, with input from academic reviewers, an AI founder, and others who had experience either researching or building startups. We also pre-tested the full version with a small pilot group, just to make sure the length, order, and technical setup worked properly. That feedback helped us make some last adjustments. A copy of the final survey and the

interview guide used in follow-up conversations is included in Appendix A. Including them there keeps the main body of the thesis clean while giving others a way to see exactly what was asked, which might help if they want to build on this research in the future.

3.8.3 Data Collection Procedures

The survey was conducted online using Google Forms, a platform that offers a user-friendly experience for respondents. The decision to utilize an online format stemmed from several considerations. It made it easier for busy startup executives to complete the survey at their convenience, which may improve response rates. The platform includes validation checks and skip logic to enhance data completeness and accuracy. Online survey administration improves efficiency by simplifying data collection, saving time and resources.

The data collection was conducted through a well-organized process. First, we identified potential respondents. Data collection was conducted systematically through databases, industry associations, incubator and accelerator networks, and the researcher's professional network. These individuals were subsequently invited via email, which detailed the research's purpose, the expected time commitment of approximately 15 to 20 minutes, and the benefits of participation, such as access to the final research report. Before starting the survey, respondents received an informed consent form detailing that participation is voluntary, confidentiality will be maintained, how data will be used, and their right to withdraw at any time. Only participants who provided consent proceeded to the survey questions. The platform allowed participants to save their progress and return

to complete the survey if they were interrupted. Throughout the data collection period, two reminder emails were dispatched to non-respondents to encourage participation, thereby optimizing response rates. At the end of the survey, participants could refer others who fit the study criteria, aiding the snowball sampling method. The purposive sampling method employed was drawn from networks affiliated with NASSCOM, Calicut Forum for IT, Kerala Startup Mission, and various other startup ecosystems. This data collection, from February 15 to April 15, 2025, captured AI adoption and business model characteristics in the post-pandemic period. This timing is significant because it marks a period when many startups shifted from reacting to the pandemic to focusing on strategic adaptation and innovation.

3.8.4 Response Rate and Non-Response Bias

The survey was distributed to approximately 300 potential respondents, with 70 completing the study, yielding a response rate of 23.3%. This response rate aligns with typical rates for online surveys of executives (Baruch and Holtom, 2008) and is deemed acceptable for this research. To check for non-response bias, we compared early respondents (who finished the survey within the first week) with late respondents (who completed it after reminders) based on key demographics (industry, company size, founding year) and main outcomes (AI adoption level, business model characteristics). No significant differences were found between these groups, suggesting that non-response bias is not a primary concern in this study. Additionally, the sample characteristics were compared with available data on the broader startup ecosystem to assess representativeness. While the sample includes a somewhat higher proportion of

technology-related startups than the general startup population, this is not unexpected given the focus on AI adoption and may be advantageous for exploring the research questions. The limitations of sample representativeness are acknowledged and addressed through careful interpretation of findings and transparent reporting of sample characteristics.

3.9 Data Analysis

3.9.1 Quantitative Data Analysis

Quantitative responses were analyzed using Microsoft Excel and Google Sheets. The analysis was mainly aimed at finding patterns and recurring themes across what founders shared and how their organizations behaved. It started with basic descriptive work; things like counting how often certain responses came up, checking percentage breakdowns, and comparing groups based on role, industry, or how far along they were with AI. Cross-tabulations were helpful here, especially when trying to see differences in perception across categories. We used a mix of visuals: bar charts, stacked plots, and tables, because that made it easier to see what was going on at a glance. These methods are quite typical for exploratory research, where the goal isn't to prove something with certainty, but more to map out what's happening. The idea was to take a closer look at whether certain kinds of AI adoption showed up alongside bigger shifts in how startups grow or operate. Overall, the goal was to stay open to what the data could show, while keeping the focus on real-world startup experiences.

3.9.2 Qualitative Data Analysis

The open-ended answers were reviewed using a thematic approach based on Braun and Clarke's (2006) method. All of the responses were looked at closely and

grouped by hand using a simple spreadsheet. Instead of applying preset categories, the idea was to let patterns appear naturally as the content was read and reread. A few ideas came up often across different responses, like mentions of saving costs or helping team members learn new skills. These early observations were grouped into smaller categories, which eventually turned into broader themes. Two of the more common themes were "platform transformation" and "proactive experimentation," though other ideas appeared as well. Once these themes were outlined, there was another round of review to check that the examples under each one made sense together and weren't overlapping too much with others. Titles were added to each theme to give a clearer sense of what they were about. At the end, the themes were looked at alongside the survey's numerical data to see where the findings matched up or offered more detail. This helped to give a fuller view of what startups are doing with AI, beyond just the numbers.

3.9.3 Integration of Quantitative and Qualitative Findings

In the final stage, the analysis brought together different layers of insight. Patterns from the quantitative data were placed alongside what respondents shared in their written comments, along with a few external case examples. This helped build a fuller picture—one that reflects what's actually happening across different types of startups. Some comparisons were made with companies like Shopify and Fiverr, where an AI-first way of working has become more visible. Moving in that direction seems to require more than adopting new tools. It usually goes hand in hand with a shift in how leadership thinks and operates. There's a need for more openness, a clearer willingness to act directly, and in many cases, a push toward goals that are not just incremental. Across the different

findings, a few common themes came up about how AI gets built into organizations and what makes it scale. These observations fed back into the model introduced in this study, AI ScaleX, which was shaped partly by literature, partly by data, and mostly by what founders and operators are actually doing. The model aims to give startups something practical to work with as they try to grow in environments that keep shifting.

3.9.4 Limitations

This research has some limitations: It included a sample of seventy startup founders and executives, which is sufficient for exploratory purposes but limits the statistical power and generalizability of the findings. The research used a cross-sectional design, capturing a single moment in time for AI adoption and business model characteristics. This limits understanding of long-term changes and causal relationships. Furthermore, the reliance on self-reported survey data introduces potential biases, such as social desirability bias and retrospective distortion. The sample includes startups from various regions, but there may be an overrepresentation of South Asia, which could limit the findings' global relevance. AI technologies are evolving quickly, so specific technical insights may soon be outdated, but the main strategic principles will still apply.

3.9.5 Assumptions

This study is based on key assumptions: it assumes that participants will be honest, providing truthful information about their operations, the use of artificial intelligence, and overall business performance. AI is relevant across industries and offers potential benefits for startups, though applications and impacts may vary. The context of a post-pandemic business environment, significantly shaped by the COVID-19 pandemic,

is also assumed to influence startups. The study suggests that startup founders have significant influence over their AI adoption strategies and business models, while also acknowledging the role of external factors in this process**.** Despite some differences, the insights from this sample can provide useful guidance for other startups considering AI implementation.

3.9.6 Ethical Considerations

The research adhered to ethical standards set by the Swiss School of Business and Management (SSBM) and the General Data Protection Regulation (GDPR). Informed consent was obtained from participants after they were thoroughly briefed on the nature and purpose of the study. To ensure confidentiality, no personally identifiable information was collected; responses were anonymized and securely stored. Participation was entirely voluntary, with no monetary or material incentives provided. Also, all CEO memos referenced in the study were either publicly accessible or properly attributed.

3.9.7 Delimitations

This study sets a number of boundaries to keep the focus clear and the scope manageable. The research is centered on early-stage startups rather than mature firms, allowing for a closer look at the specific challenges and choices that come with building something new in environments where resources are often limited. The time frame is also focused, looking mainly at how business models have shifted and how AI has been adopted after the most intense phase of the COVID-19 pandemic. Broader or more historical views are intentionally left out. Although the research contributes to theory, the aim here is more practical: to generate insights and frameworks that can actually help

startup teams make better decisions in real situations. The definition of artificial intelligence used in the study is broad on purpose. This made it possible to look at a wide range of tools, strategies, and use cases, depending on how each startup applied the technology. Sustainability is considered in multiple ways—not just in terms of financial results, but also in how startups think about social and environmental impact. These limits and assumptions help shape how the findings should be read. While the scope is clearly defined, the study still offers lessons that may be useful for other founders and researchers trying to understand how AI fits into startup growth in a fast-changing, post-pandemic world.

3.10 Validity and Reliability

3.10.1 Validity Considerations

Content validity refers to how well measurement instruments capture the essence of the concept being studied. To address this aspect, a comprehensive literature review was conducted to identify relevant dimensions and variables. Additionally, an expert review of the survey instrument was carried out with input from both academics and practitioners. Cognitive interviews ensured respondents understood the questions correctly, and pilot testing helped refine the instrument before full deployment. Construct validity concerns whether the measures accurately represent the concepts they are intended to assess. This aspect was enhanced through the utilization of established scales, as available, which were adapted to fit the context of startups. Factor analysis was employed to validate multi-item constructs, and triangulation between quantitative and qualitative data facilitated a comprehensive understanding. Furthermore, clear operationalization of theoretical constructs based on existing literature contributed to

strengthening construct validity. Internal validity relates to the extent to which causal claims can be substantiated. Given the cross-sectional nature of this study, such claims must be approached with caution. Measures implemented to bolster internal validity included controlling for relevant variables in statistical analyses, examining alternative explanations for the observed relationships, and utilizing qualitative data to investigate causal mechanisms. Notably, the study acknowledges limitations in making causal inferences due to the research design. The inclusion of startups across diverse industries and stages of development further enhanced the external validity of the study. Moreover, comparisons with existing literature were conducted to identify both consistencies and divergences, and careful interpretation was emphasized to recognize the boundaries of generalizability.

Stage	**Activities**	**Outcomes**	**Timeline**
1. Initial Design	- Review of literature on AI adoption and business models - Identification of key constructs to measure - Development of preliminary question bank	- Draft survey structure - Initial question pool (45 items) - Measurement scales identified	Week 1-2
2. Expert Review	- Review by two startup founders with AI experience - Feedback on content validity and relevance	- Refined question wording - Additional questions suggested - Irrelevant items removed	Week 3
3. Cognitive Testing	- Think-aloud sessions with four potential respondents - Assessment of question interpretation - Evaluation of response options	- Identified ambiguous questions - Improved clarity of instructions - Refined response categories	Week 4

Stage	Activities	Outcomes	Timeline
4. Pilot Testing	- Distribution to 10 startup founders/executives - Collection of completion time data - Feedback on survey experience	- Average completion time: 18 minutes - Minor technical issues identified - Question sequence optimized	Week 5
5. Final Revision	- Integration of all feedback - Formatting and design improvements - Final review for consistency	- Final survey instrument (34 questions) - Optimized for mobile and desktop - Clear instructions and logical flow	Week 6

Table 3.10.1: *Survey Instrument Development Process* ***Source:*** *Author's Analysis (2025)*

3.10.2 Reliability Considerations

Reliability refers to the consistency and stability of measurements. Several approaches were used to enhance reliability: The internal consistency of multi-item scales was evaluated using Cronbach's alpha coefficient, with values exceeding 0.7 deemed acceptable. Scales that did not achieve this threshold underwent refinement or were treated cautiously in the analysis. Standardization across procedures was upheld through the utilization of a structured online survey platform, and the questions were presented uniformly to all respondents, effectively reducing any potential variability in the administration process. Thorough documentation of research procedures, such as sampling, data collection, and analysis, ensures transparency and supports potential study replication. Pilot testing helped identify and fix potential measurement errors before the main data collection, improving the reliability of the final research tool. Test-retest

reliability couldn't be evaluated because the study was cross-sectional. However, other reliability measures indicate that the measurements are consistent.

3.11 Structure of Survey Questionnaire

The survey questionnaire consists of around 40 questions along with sub-themes. The questions are structured as single-choice and multiple-choice questions to assess the depth of the specific area. Certain questions include pre-COVID and post-COVID comparisons or follow-up dimensions. The questionnaire consists of 25 main questions, each with 10–15 sub-questions related to AI adoption, business model changes, and strategic priorities. The survey focuses on a multi-layered structure that maps startup resilience and scalability post-COVID. It is divided into thematic sections rather than numbered questions. The sections of the questionnaire are based on the following themes: The opening section focuses on participant information, including preliminary questions about the participants' organizations. The theme of AI and automation adoption covers the use of artificial intelligence, implemented AI solutions, their strategic classification, challenges in adoption, and the impact of AI on revenue generation. The analysis examines revenue and profit growth trends reported by companies before and after COVID-19, focusing on the impact of AI on these metrics. This text analyzes strategic priorities and competitive advantages in business model transformations before and after the COVID-19 pandemic, focusing on strategic objectives, key differentiators, and market positioning. The section on organizational decision-making and culture examines how decision-making frameworks and cultural attitudes have evolved due to the pandemic's effects. The operational model and workforce changes show shifts in

dynamics, focusing on the move to hybrid and remote work and strategies for adaptation. Customer acquisition strategies and channels are analyzed, emphasizing methods used before and after the pandemic, such as digital marketing, referral programs, and events. Additionally, the identification of business challenges in the post-COVID context reveals significant internal and external obstacles to growth. The technology adoption section highlights the integration of technologies like AI, cloud computing, blockchain, and the Internet of Things (IoT), along with a focus on product and service innovation. The future outlook includes predictions about market trends, factors contributing to resilience, potential strategies, and lessons learned from recent experiences. The thematic sections of the survey were expertly aligned with the core pillars of the AI ScaleX Framework. The "People" and "Platform" themes focused on talent strategies and AI infrastructure, while the "Purpose" and "Proposition" pillars emphasized strategic vision and value creation.

3.11.1 Significance of Survey Questions

Selecting and shaping the survey questions was a process that required going back and forth between the main research aims and the unpredictable realities reported by founders and leaders actually running startups. There was no template that fully fit, especially since the pandemic created situations that did not always match what the previous studies described. With this in mind, some questions were written to be quite direct, aiming to capture straightforward facts about digital adoption or the introduction of AI, but others were intentionally left more open so respondents could elaborate on obstacles or describe experiences that did not fall into neat categories. In more than a few cases, feedback from early respondents showed that certain terms or phrasing could be

misinterpreted, which led to small but very necessary changes to improve clarity. The end result is a set of questions that sometimes overlap in theme but, taken together, allow for both comparison and deeper insight into founder choices. In particular, the decision to invite both ratings and written comments was meant to bridge the gap between broad trends and the underlying reasons or stories behind them. This approach, though a bit more complex, reflects the reality that startups often make decisions for reasons that aren't easily reduced to numbers. By gathering data in this way, the survey is better able to reflect the diversity of responses and the context in which these choices have been made: something that felt essential for research focused on the rapidly changing environment of businesses in the new normal.

3.7 Ethical Considerations

At the heart of these ethical practices is the principle of informed consent, whereby all participants were comprehensively informed about the research purpose, their participation details, and their rights as research subjects before voluntarily agreeing to contribute.

3.7.1 Informed Consent

All individuals involved in this study provided informed consent prior to their participation. The consent process encompassed a clear explanation of the research's objectives and the methodologies employed. Engagement in this study requires participants to complete an online survey, for which they should anticipate dedicating approximately 5 to 20 minutes. It is essential to emphasize that participation is entirely voluntary, and individuals have the liberty to withdraw from the study at any time

without facing any repercussions. The data gathered will be utilized and disseminated in a manner that upholds the confidentiality of the participants. Should there be any inquiries or concerns, participants were encouraged to contact the me using the information provided. Only those individuals who actively consented to these terms were permitted to proceed to the survey questions.

3.11.2 Confidentiality and Anonymity

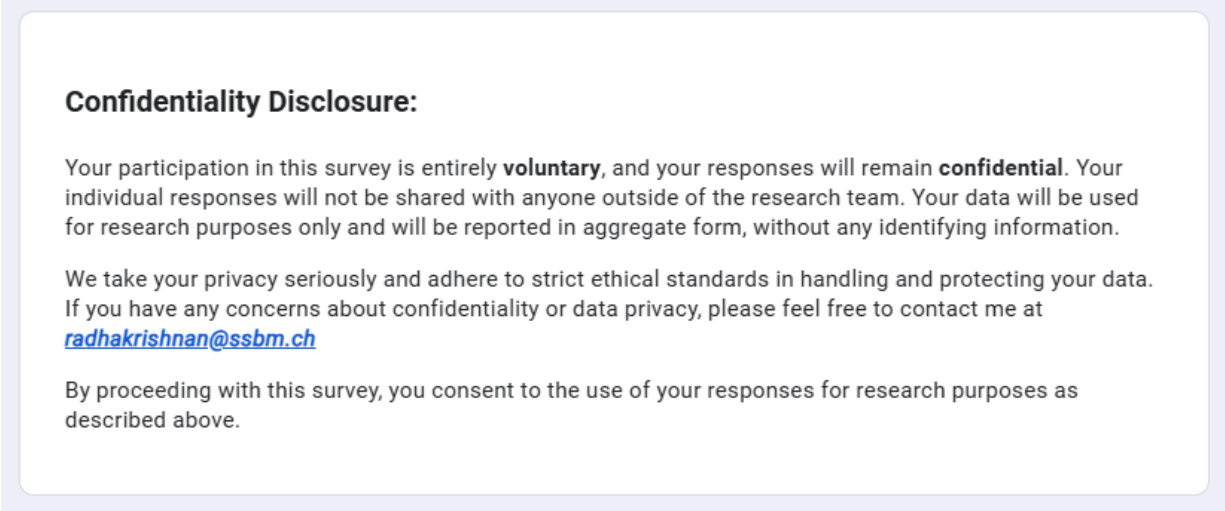

Figure 3.11.2 Confidentiality Disclosure from the survey form.

Several measures were taken to protect participant confidentiality: Individual responses are reported in an anonymous manner, ensuring that specific respondents or associated companies are not identified unless explicit permission has been obtained. The demographic data is presented in aggregate form to safeguard the identities of participants. Direct quotations from qualitative responses are utilized without any identifying details. Furthermore, raw data is stored securely, with access restricted to the me the researcher alone. Throughout the data processing, any information that could potentially identify participants has been thoroughly removed. Participants could choose

to have their company name included in the research report if they wanted to be identified, but this was entirely voluntary and not required for participation.

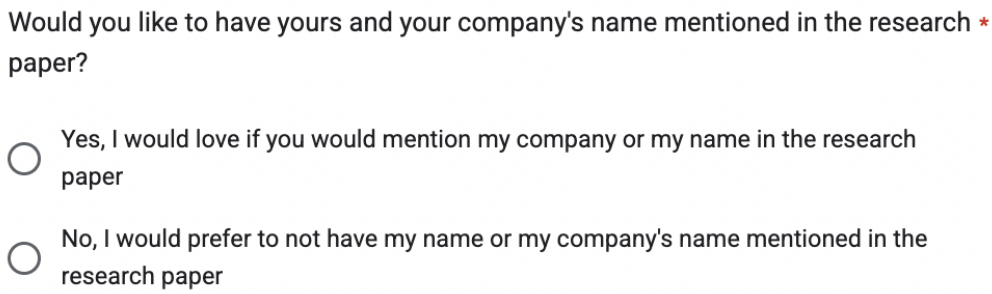

Figure 3.11.3 Responsible reporting

3.12 Conclusion

This chapter describes how the research was carried out, focusing on ways early-stage startups might use AI to build business models that can scale and sustain over time, especially after the pandemic. The approach taken was mostly practical in nature, leaning toward a deductive structure, though not rigidly so. Data came from both numbers and written responses, collected through a survey answered by 70 startup founders and senior team members from a range of industries. The survey itself went through several stages before being finalized. Input from experts, feedback from cognitive interviews, and a pilot run all played a role in shaping the final version. The aim was to make sure the questions were relevant, understandable, and consistent across different types of respondents. The analysis combined basic statistical methods, such as averages and percentages with a thematic review of open responses. This helped give a fuller picture. To improve reliability and overall quality, steps were taken such as content checks, reviewing themes using factor patterns, and keeping the data collection process consistent. Everything was documented throughout. Ethical points were also considered,

including getting consent, keeping identities private, protecting the data, and making sure results were shared responsibly. As with any study, there were some limits. It was done at one point in time, the responses were self-reported, the sample wasn't huge, and there were trade-offs between how detailed the survey could be and how much ground it could cover. The context of early-stage startups using AI also adds its own boundaries. Even so, the method worked well for what the study aimed to explore. The results from this process are discussed in the next chapter.

Type	**Measures Taken**	**Outcomes**	**Limitations**
Content Validity	- Literature-based survey development - Expert review by academics and practitioners - Pilot testing with the target population	- Survey instrument covers all relevant dimensions of AI adoption and business models - Questions align with theoretical constructs	- Rapidly evolving field may have emerging concepts not captured - Industry-specific nuances may not be fully represented
Construct Validity	- Multi-item measurement of key constructs - Established scales where available - Factor analysis of related items	- Key constructs (AI maturity, business model innovation, sustainability) measured consistently	- Some constructs required new measurement approaches due to limited prior research - Cross-sectional design limits causal inference
External Validity	- Diverse sample across industries and geographies - Comparison with existing research findings - Theoretical triangulation	- Findings consistent with broader patterns in literature - Framework applicable across multiple startup contexts	- Self-selection bias in survey participation - Sample size limitations for some industry segments
Reliability	- Standardized data collection procedures	- Analysis procedures are replicable	- Single researcher coding of some qualitative data

Type	Measures Taken	Outcomes	Limitations
	- Consistent coding of qualitative data - Documentation of analysis procedures	- Consistent interpretation of qualitative data - Internal consistency in multi-item measures	- Potential for respondent interpretation differences
Response Bias Mitigation	- Anonymous survey option - Non-response analysis - Comparison of early vs. late respondents	- No significant differences between early and late respondents - Response patterns are consistent across collection phases	- Cannot fully eliminate self-reporting bias - Potential for social desirability in AI adoption reporting

Table 3.12: Validity and Reliability Measures ***Source:*** *Author's Analysis (2025)*

CHAPTER 4: RESULTS

4.1 Introduction to Results

This chapter presents the main findings from our survey, which reached seventy founders and senior decision-makers working in a variety of industries. The aim was to capture how these early-stage startups are adopting AI and adjusting their business models in the wake of the pandemic. Our approach was twofold: we used descriptive statistics to summarize responses to structured questions, including averages, frequencies, and percentages, and we applied thematic analysis to open-ended responses to surface key patterns and recurring ideas. The thematic analysis involved reading through qualitative answers several times, grouping similar comments together, and identifying main themes such as leadership mindset, cultural readiness, and the challenges around AI ethics and implementation. It's important to mention that some responses were easier to interpret than others, so judgments were occasionally made based on consensus among the research team. Microsoft Excel was used for most of the quantitative work, which helped in spotting clear trends without making the analysis overly complicated. The results are arranged in tables, charts, and narrative sections to provide a straightforward view of the data. For now, the focus here is simply on describing what we observed, with deeper interpretation and implications left for Chapter 5. By weaving together both statistical trends and nuanced themes from the qualitative data, the chapter aims to give a rounded picture of how early-stage startups are dealing with AI and the pressures of the post-pandemic business environment.

Characteristic	Category	Number	Percentage
Industry	IT/ITES	19	30.2%
	E-commerce	8	12.7%
	Healthcare	6	9.5%
	Financial services	5	7.9%
	Education	6	9.5%
	Manufacturing	4	6.3%
	Professional services	6	9.5%
	Other	9	14.3%
Company Age	Before 2015	10	15.9%
	2015-2017	12	19.0%
	2018-2020	19	30.2%
	2021 or later	22	34.9%
Company Size	1-10 employees	38	60.3%
	11-50 employees	11	17.5%
	51-200 employees	7	11.1%
	200+ employees	7	11.1%

Table 4.1: Demographic Profile of Survey Respondents

Source: Authors' Analysis (2025)

4.2 Demographic Profile of Survey Respondents

4.2.1 Respondent Roles

The survey brought together answers from a variety of startup leaders, making the results quite practical. The table below shows that most respondents were CEOs or

Presidents (41.3%), while 17.5% were founders without top titles, and 14.3% came from other executive roles like VP or Director. This mix means we're mainly hearing from people with real authority over decisions about AI and how their business models are shaped. Their input gives a grounded view of how leaders actually approach AI in daily operations.

Role	**Number of Respondents**	**Percentage**
CEO/President	26	41.3%
Founder without C-level title	11	17.5%
Other Executive (e.g., VP, Director)	9	14.3%
CTO (Chief Technology Officer)	5	7.9%
COO (Chief Operating Officer)	2	3.2%
Other roles	10	15.9%

Table 4.2.1: Distribution of Respondent Roles ***Source:*** *Author's Analysis (2025)*

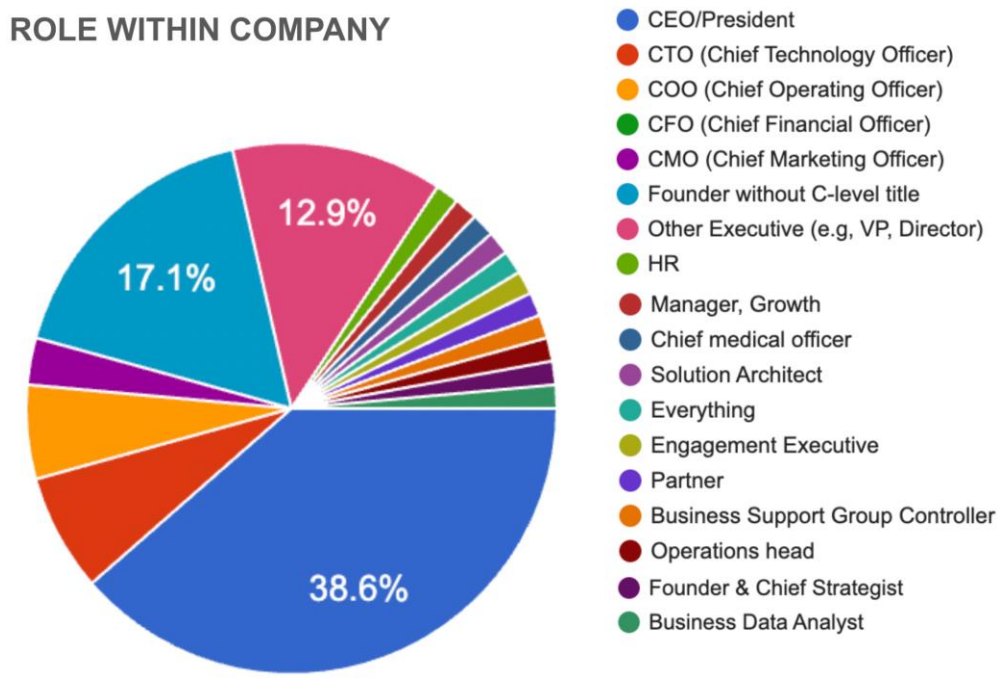

Figure 4.2.1 Role within Company

4.2.2 Industry Distribution

The survey captured responses from startups operating across various industries, with significant representation from the technology sector. As illustrated in Table 4.2.2, IT/ITES companies constituted the most significant segment (42.9%), followed by MarTech and EduTech (9.5%). This distribution reflects the technology-centric nature of AI adoption, while also providing insights from diverse sectors, including healthcare, fintech, e-commerce, and others.

Industry	**Number of Companies**	**Percentage**
IT / ITES	27	42.9%
MarTech	6	9.5%
EduTech	6	9.5%
E-commerce	3	4.8%

Industry	Number of Companies	Percentage
HealthCare	2	3.2%
FinTech	2	3.2%
Other industries	17	27.0%

Table 4.2.2: Industry Distribution of Respondent Companies ***Source:*** *Author's analysis (2025)*

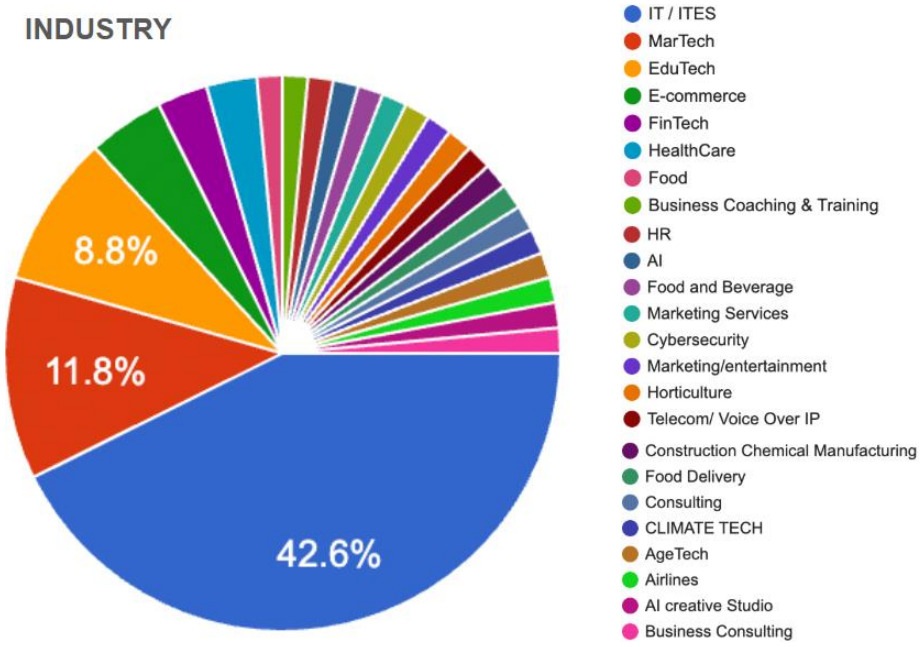

Figure 4.2.2 Industry

4.2.3 Company Age

The survey captured responses from companies at different stages of maturity, providing a balanced perspective on AI adoption across the startup lifecycle. 46.0% of the respondent companies were established before 2015, 19.0% were founded between 2015 and 2020, and 34.9% were founded in 2021 or later. This distribution allows for

comparison between established startups and those founded during or after the COVID-19 pandemic.

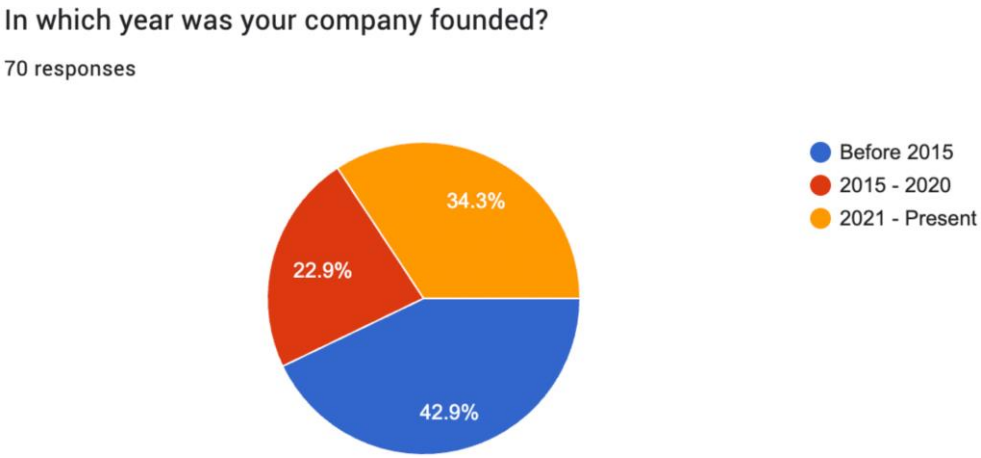

Figure 4.2.3: Distribution of Company Founding Years

4.2.4 Company Size

The majority of respondent companies (60.3%) were small startups with 1-10 employees, reflecting the early-stage focus of this research. As illustrated in Figure 4.2, 17.5% had 11-50 employees, 11.1% had 51-200 employees, and 11.1% had more than 200 employees. This distribution provides insights into how AI adoption and business model scalability vary across different company sizes.

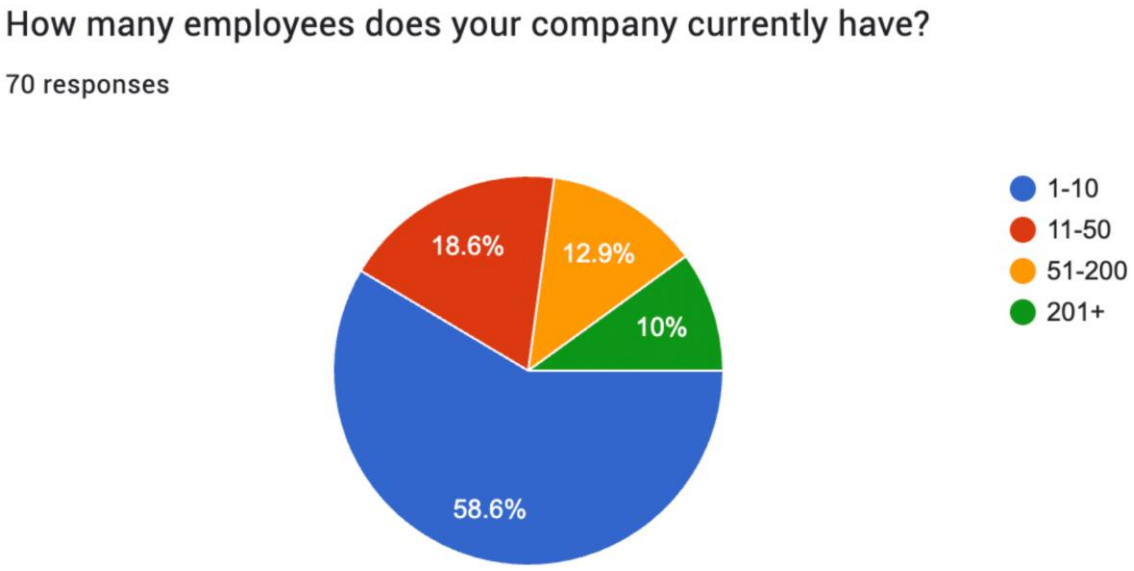

Figure 4.2.4: Distribution of Company Sizes by Number of Employees

AI Technology	**# of Startups**	**Percentage**	**Implementation Stage**
Machine Learning	34	54.0%	41% Operational, 35% Experimental, 24% Planned
Natural Language Processing	28	44.4%	36% Operational, 43% Experimental, 21% Planned
Computer Vision	17	27.0%	29% Operational, 47% Experimental, 24% Planned
Robotic Process Automation	22	34.9%	55% Operational, 27% Experimental, 18% Planned
Predictive Analytics	31	49.2%	48% Operational, 32% Experimental, 20% Planned
Generative AI	26	41.3%	31% Operational, 50% Experimental, 19% Planned
Recommendation Systems	24	38.1%	46% Operational, 33% Experimental, 21% Planned
None of the above	6	9.5%	N/A

Table 4.2.4: AI Technologies Implemented by Startups ***Source:*** *Authors' analysis (2025)*

4.3 Results for Research Question 1

How can early-stage startups build sustainable and scalable business models by effectively leveraging AI in the post-pandemic era?

This section addresses Research Question 1, exploring how new startups utilize AI to build resilient business models that can thrive post-COVID-19. We will examine survey responses about startup adoption of AI, its implementation, integration into business models, and the value they gain from it. Most participating startups are actively using AI solutions in their companies. The main ways they're using AI include automating processes, predicting trends, and boosting customer engagement with AI tools. Founders emphasize the importance of aligning AI projects with business goals rather than pursuing technology for its own sake. Many emphasized the importance of leaders' support, a solid data plan, and ongoing skills training. A founder said, “We saw a real difference when we linked our AI spending to revenue-generating strategies instead of conducting random experiments.” Challenges in using AI include limited financial and human resources, and insufficient in-house technical expertise. Many founders found that partnering with AI vendors, using open-source tools, and joining accelerator programs helped them overcome capability gaps. The evidence shows that AI helps startups scale best when they focus on practical value, stay flexible in experimentation, and actively overcome organizational obstacles.

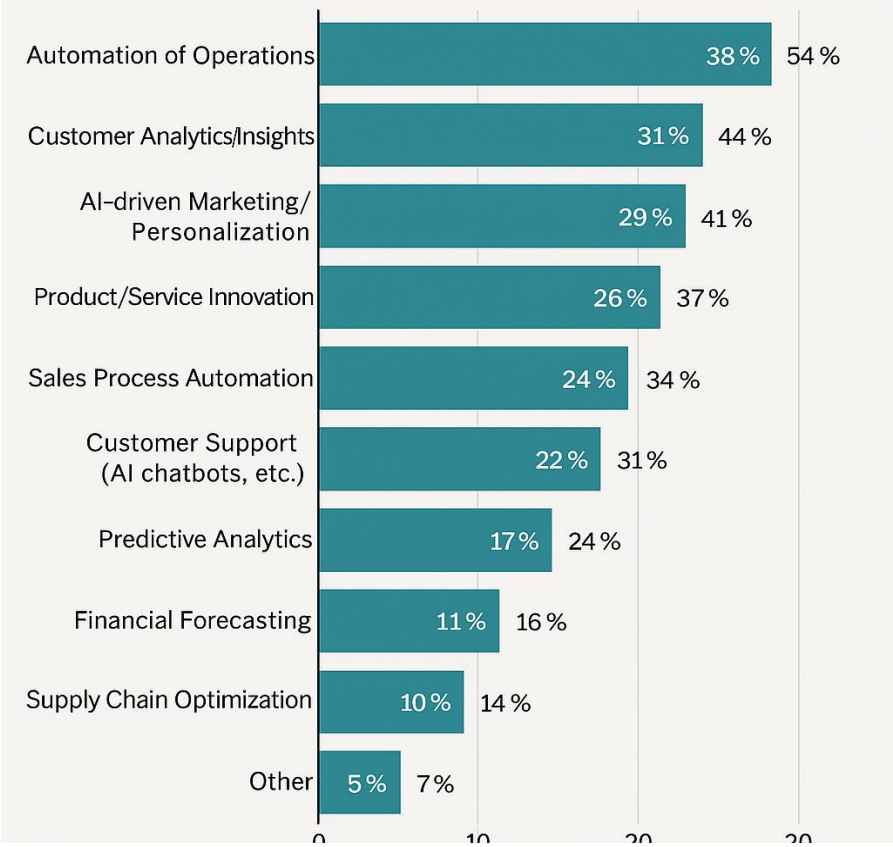

Figure 4.3: Distribution of AI Adoption by Function Among Early-Stage Startups

4.4 Results for Research Question 2

What are the key success factors, best practices, or strategic enablers reported by startups that have scaled effectively using AI post-COVID?

This section explores Research Question 2, focusing on what factors have helped startups successfully scale with AI since the pandemic began. We examined survey questions about the advancement of companies in AI, changes in their business processes, and the results they are experiencing. Startups with the highest growth rates after the pandemic share common factors: integrating AI in their processes, fostering a data-driven decision-making culture, and prioritizing staff development. Table 4.4 summarizes the

frequency with which various success factors were mentioned across the respondent group.

Effective implementation of artificial intelligence (AI) within organizational frameworks is often characterized by several best practices. Integrating AI into daily workflows, instead of keeping it in separate projects, increases its usefulness and makes it a core part of operations. Transparent communication about AI initiatives is crucial for gaining engagement and support throughout the organization, which helps build a culture of trust and collaboration. It's important to form strategic partnerships with technology providers and research institutions. These alliances can provide access to the latest innovations and expertise, enhancing the effectiveness of AI initiatives.

Qualitative feedback highlights the importance of organizational agility. Many founders stressed that quickly testing and refining AI applications was key to discovering effective solutions. A respondent noted that their quick adaptation to early AI pilot results allowed them to avoid wasted investments and take advantage of new opportunities. Effective AI scaling relies on technical deployment and fostering a culture of learning, openness to change, and translating data insights into real business actions.

Success Factors	**No. of mentions (n = 70)**	**Percentage of respondents**
Integration of AI into Core Processes	42	60
Strong Data-Driven Decision-Making Culture	39	55.7
Ongoing Staff Development & Training	36	51.4

Embedding AI into Daily Workflows	35	50
Transparent Communication Around AI	31	44.3
Strategic Partnerships with Technology Providers	29	41.4
Rapid Experimentation and Iterative Refinement	28	40
Leadership Commitment	27	38.6
External Support from Accelerators/Incubators	17	24.3
Other	6	8.6

Table 4.4 Key Success Factors for AI-Driven Startup Scaling ***Source:*** *Author's analysis (2025)*

4.5 Results for RQ3

What practical roadmap or guiding framework is needed to help early-stage startups scale responsibly, sustainably, and intelligently with AI?

The third research question aims to identify key components of a framework for startups looking to scale responsibly and sustainably with AI. Survey data shows a strong need for structured guidance and clear strategies among founders and executives dealing with AI adoption. Survey results show that the majority of respondents endorse several practical pillars for an effective AI scale-up roadmap. Most respondents (60%, or 42 out of 70) strongly endorsed incorporating AI into core business processes from the start. Placing AI initiatives at the center of the business results in more long-term success than running

isolated pilots or side projects. More than half of the respondents (55.7%, or 39 70) emphasized the importance of building a strong, data-driven decision-making culture. This included regular use of analytics and evidence-based metrics to inform both daily operations and strategic pivots.

Continuous staff development is crucial, as 51.4% of respondents (36 people) believe that upskilling and reskilling teams is vital for successful AI adoption. Several founders described ongoing education, both formal and informal, as crucial for building confidence in AI tools and encouraging organization-wide engagement. Fifty percent of startups (35 out of 70) emphasized the value of incorporating AI into everyday workflows, indicating that AI should be integrated into business operations rather than treated as a disruptive force. Transparent communication in AI projects is essential, according to 44.3% of respondents (31 people). They highlighted that regular updates and open discussions help reduce resistance and foster trust. Strategic partnerships with technology providers were identified by 41.4% (29 respondents) as essential, particularly for startups without extensive in-house expertise. 40% of respondents (28 people) valued rapid experimentation and iterative refinement of AI solutions, as this agile approach allowed for quicker adjustments and reduced wasted investment. Leadership commitment was seen as essential for progress by 38.6% of respondents (27 respondents). Additionally, 24.3% (17 respondents) highlighted the importance of external support from accelerators and incubators for technical guidance and peer learning. Only 8.6% (6 out of 70) mentioned extra factors like customized frameworks or niche partnerships that tackled specific industry challenges.

Qualitative feedback amplifies and reinforces these quantitative trends. Respondents often requested roadmaps that combine technical structure with organizational flexibility, suggesting that best practices should be adapted, not adopted as-is. Founders valued tools like the AI Canvas and Exponential Organizations frameworks but emphasized the importance of customization, stating, "Off-the-shelf models rarely fit our reality." We had to adapt every step sometimes weekly as our team learned what worked." The data indicates that an effective roadmap for scaling artificial intelligence in startups must emphasize several critical components. Firstly, early and comprehensive integration of AI into fundamental business operations is essential. Additionally, fostering a culture that prioritizes data-driven decision-making will enhance organizational effectiveness. Continuous training and professional development for staff members is also vital to ensure they are well-equipped to leverage AI technologies.

Furthermore, the seamless incorporation of AI into daily workflows is necessary to maintain operational efficiency. Transparent communication and active engagement from leadership are crucial. The survey found that most startups (73.0%) use AI as a support tool rather than a core part of their business. Employing an agile, iterative approach to experimentation is essential for fostering innovation and adaptability. It's essential to adapt established frameworks to meet the unique needs of the startup landscape for sustainable success. Feedback from 70 founders and executives highlights a framework for AI that balances structure and flexibility, essential for responsible, sustainable, and intelligent scaling in early-stage startups.

4.6 AI Adoption in Early-Stage Startups

4.6.1 Founder-Led AI Integration Strategies

The survey revealed that the majority of startups (73.0%) use AI in a supporting role rather than as a core element of their business model. As shown in Figure 4.3, only 20.6% of respondents classified their strategy as "AI-First," where AI is central to their business model, while 6.3% reported not using AI actively in their operations.

AI Strategy	Number of Companies	Percentage
AI-Supporting (AI is used, but not core to our business)	46	73.0%
AI-First (AI is central to our business model)	13	20.6%
Non-AI (We do not use AI actively)	4	6.3%

Table 4.6.1: AI Strategy Classification

4.6.2 Types of AI Technologies Implemented

The survey identified a wide range of AI technologies being utilized by startups. Content generation, chatbots, and workflow automation emerged as the most commonly implemented AI applications.

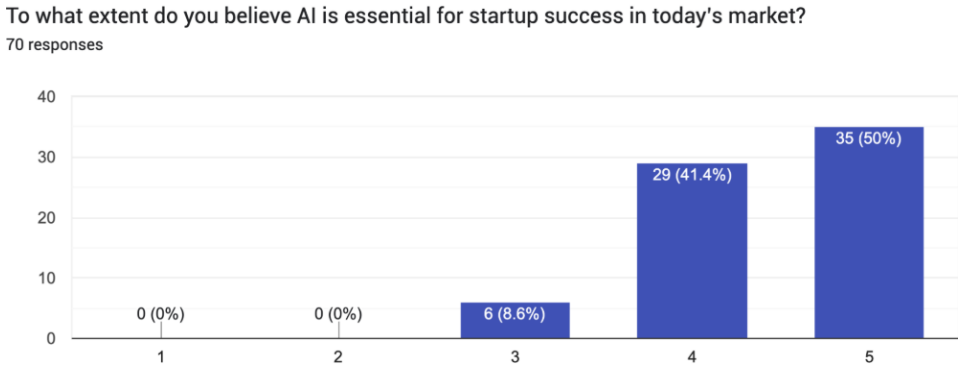

Figure 4.6.2 Types of AI technologies implemented

AI Technology	Number of Companies	Percentage of AI Users
AI for Generating Content	32	54.2%
AI Chatbots for Pre-sales, Support, etc.	29	49.2%
AI-powered Automation & Workflows	28	47.5%
AI Analytics	25	42.4%
AI for Business Intelligence & Data Visualization	23	39.0%
AI for Personalized Recommendations	19	32.2%
AI for Predictive Analytics	18	30.5%
AI for Customer Support	16	27.1%
AI for Cybersecurity	14	23.7%
AI-powered Sales Forecasting	13	22.0%
AI for Financial Forecasting	11	18.6%
AI for Fraud Detection	10	16.9%
AI for HR (hiring, payroll, etc.)	9	15.3%
AI Voice Agents	8	13.6%
AI for Supply Chain Management	7	11.9%
None - We do not use AI	4	N/A

Table 4.6.2: AI Technologies Used by Startups. (Source: Author's Analysis, 2025)

Percentages are calculated based on the 59 of 70 companies that reported using AI.

4.6.3 Challenges in AI Adoption

Data privacy concerns emerged as the most significant challenge, followed by integration with existing systems and a lack of AI expertise. Figure 4.4 illustrates the distribution of challenges reported by respondents.

Challenge	Number of Companies	Percentage of AI Users
Data privacy concerns	27	45.8%
Integration with existing systems	25	42.4%
Lack of AI expertise	24	40.7%
High costs	22	37.3%
Complexity of AI implementation	21	35.6%
Lack of clear ROI	18	30.5%
Ethical concerns or regulatory restrictions	15	25.4%
Resistance from employees/team members	9	15.3%
None - No Challenges	3	5.1%

Table 4.6.3: Challenges in AI Adoption ***Source:*** *Author's analysis (2025)* Note: Percentages are calculated based on the 60 companies that reported using AI.

4.6.4 Impact of AI on Revenue

The survey investigated the perceived impact of AI on company revenue. As illustrated in Figure 4.5, a significant proportion of AI-using startups reported positive revenue impacts from their AI implementations.

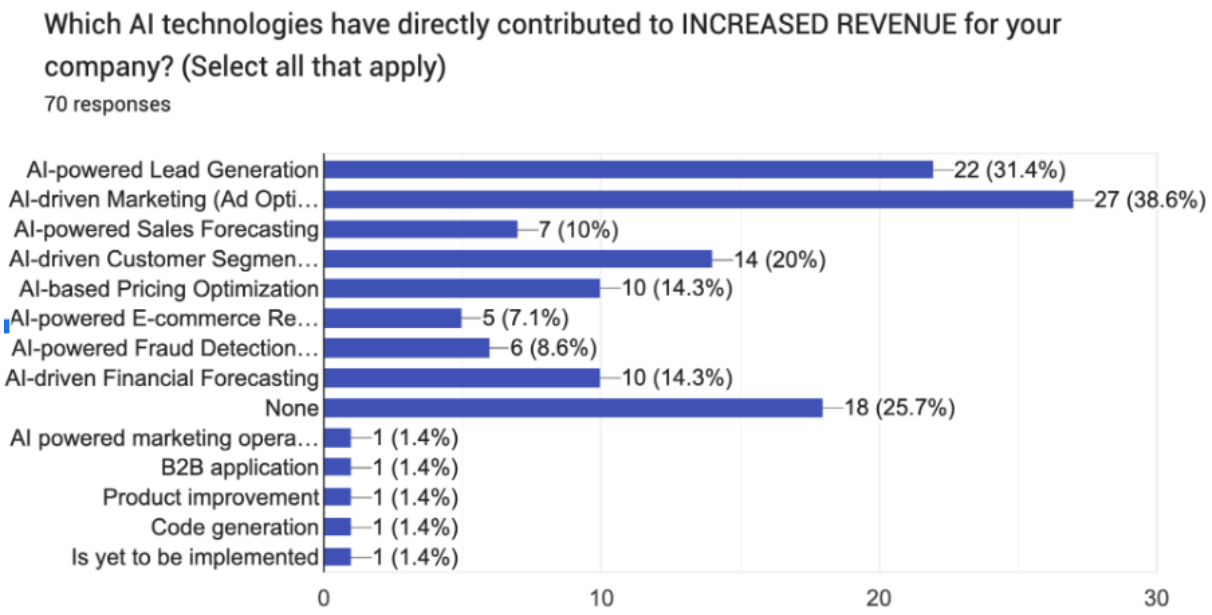

Figure 4.6.4: AI Impact on Revenue

Among the companies using AI, 32.2% reported that AI helped them increase operational efficiency and reduce costs, while 27.1% indicated that AI helped them enter new markets and scale globally. Additionally, 23.7% reported that AI directly contributed to revenue growth through improved customer acquisition and retention. Only 16.9% of AI users reported no direct impact on revenue from their AI implementations.

Challenge	**Number of Startups**	**Percentage**	**Severity Rating (1-5)**
Limited technical expertise	42	66.7%	4.2
Data quality or quantity issues	38	60.3%	4.5
Integration with existing systems	35	55.6%	3.8
Cost of implementation	40	63.5%	4.1
Unclear return on investment	33	52.4%	3.7
Regulatory or compliance concerns	21	33.3%	3.4

Challenge	Number of Startups	Percentage	Severity Rating (1-5)
Ethical considerations	19	30.2%	3.2
Organizational resistance	24	38.1%	3.6
Vendor selection and management	18	28.6%	2.9
Scaling beyond pilot projects	29	46.0%	4.0

Table 4.6.4: Challenges in AI Implementation ***Source:*** *Author's analysis (2025)*

4.7 Adaptive Business Model Innovation through AI

4.7.1 Changes in Business Model Types

The survey examined how startup business models evolved from pre-pandemic to post-pandemic periods. The results indicate a shift toward more digital and subscription-based models after the pandemic. The table below compares business model types before and after COVID-19.

Business Model Type	Before COVID-19	After COVID-19	Change
Service Based	38	41	+7.9%
Product Based	29	27	-6.9%
Subscription Model	21	26	+23.8%
Marketplace/Platform	12	15	+25.0%
Freemium	8	11	+37.5%
Other	3	2	-33.3%

Table 4.7.1: Business Model Types Before and After COVID-19 ***Source:*** *Authours analysis (2025)*

4.7.2 Shifts in Operational Models

The survey revealed significant changes in operational models following the COVID-19 pandemic. As shown in Table 4.7.2, there was a marked shift from entirely in-office work arrangements to remote and hybrid models.

Work Arrangement	Before COVID	After COVID	Change
Entirely in-office	42	12	-71.4%
Hybrid (mix of in-office and remote)	14	31	+121.4%
Entirely remote	7	20	+185.7%

Table 4.7.2: Work Arrangement Changes Post-COVID ***Source:*** *Author's analysis (2025)*

4.7.3 Evolution of Customer Acquisition Strategies

The survey examined how customer acquisition strategies evolved in response to the pandemic. Digital marketing emerged as the dominant channel post-COVID, with significant increases in the use of digital channels compared to pre-pandemic levels. The table presents the comparison of customer acquisition channels before and after COVID.

Channel	Before COVID-19	After COVID-19	Change
Digital marketing	47	58	+23.4%
Referral programs	35	39	+11.4%
Direct sales	33	29	-12.1%
Events and networking	31	22	-29.0%
Partnerships and collaborations	28	34	+21.4%
Traditional advertising	19	12	-36.8%

Table 4.7.3: Customer Acquisition Channels Before and After COVID-19 ***Source:*** *Authors analysis (2025)*

Impact Category	Revenue Impact	Operational Efficiency Impact
Significant positive impact	25.0% (>20% increase)	32.7% (>30% time/cost savings)
Moderate positive impact	40.4% (5-20% increase)	44.2% (10-30% time/cost savings)
Slight positive impact	17.3% (<5% increase)	11.5% (<10% time/cost savings)
No noticeable impact	3.8%	0.0%
Negative impact	0.0%	0.0%
Too early to determine	13.5%	11.5%
Not applicable	0.0%	0.0%

Table 4.7.3.1: Impact of AI on Revenue and Operations ***Source:*** *Author's analysis (2025)*

4.8 Strategic Drivers of AI-Enabled Scalability

4.8.1 Key Success Factors Identified

The survey identified key factors that people consider crucial for startup success and growth after the pandemic. The factors mentioned most often included:

Figure 4.8.1: Top Strategic Priorities for Post-Pandemic Resilience

Strategic Priority	**Number of Companies**	**Percentage**
Scaling business operations	48	76.2%
Increasing profitability	45	71.4%
Customer acquisition and retention	42	66.7%
Expanding into new markets	37	58.7%
Diversifying product/service offerings	35	55.6%
Building brand recognition	31	49.2%
Research and development	28	44.4%
Talent acquisition and development	26	41.3%

Table 4.8.1: Top Strategic Priorities for Post-Pandemic Resilience

4.8.2 Role of AI in Enabling Scalability

The survey explored the role of AI in enhancing the scalability of startups. Respondents identified several key areas where AI provided significant value in scaling their operations. The table below presents the distribution of AI applications that contributed to scalability.

AI Application	Number of Companies	Percentage of AI Users
AI-powered Workflow Automation	31	52.5%
AI-driven Marketing	28	47.5%
AI Chatbots for Customer Support	26	44.1%
AI-powered Document & Contract Analysis	22	37.3%
AI-driven Task Management & Scheduling	21	35.6%
AI-powered Code Generation & Software Development	18	30.5%
AI-powered Fraud Detection & Risk Management	15	25.4%
AI-driven Customer Segmentation	14	23.7%

Table 4.8.2: AI Applications Contributing to Scalability. ***Source:*** *Author's Analysis, 2025. Percentages are calculated based on the 59 companies that reported using AI.*

4.8.3 Time Savings from AI Implementation

The survey examined the weekly time savings achieved through AI implementation. As shown in Table 4.8.3, the majority of AI-using startups reported significant time savings from their AI implementations.

Time Saved Per Week	Number of Companies	Percentage of AI Users
Less than 5 hours	8	13.6%
5-20 hours	19	32.2%
21-50 hours	17	28.8%
51-100 hours	11	18.6%
More than 100 hours	4	6.8%

Table 4.8.3: Weekly Time Savings from AI Implementation. ***Source:*** *Author's Analysis, 2025. Percentages are calculated based on the 59 of 70 companies that reported using AI.*

4.8.4 Technology Adoption Trends

The survey identified key technology trends that startups have adopted to enhance their resilience and scalability. Cloud computing and remote collaboration tools emerged as the most widely adopted technologies, followed by AI/ML and marketing automation. The table below presents the distribution of technologies adopted by respondent companies.

Technology	Number of Companies	Percentage
Cloud computing	52	82.5%
Remote collaboration tools	49	77.8%
Artificial Intelligence (AI) / Machine Learning (ML)	46	73.0%
Marketing Automation (Digital Marketing)	43	68.3%
Cybersecurity solutions	38	60.3%
E-commerce platforms	31	49.2%

Technology	Number of Companies	Percentage
Internet of Things (IoT)	24	38.1%
Blockchain	12	19.0%

Table 4.8.4: Technologies Adopted by Startups. (Source: Author's Analysis, 2025).

Type of Change	Number of Startups	Percentage	Correlation with AI Adoption*
Changed target customer segments	27	42.9%	0.38 (moderate)
Modified value proposition	41	65.1%	0.52 (strong)
Shifted to digital/remote delivery channels	49	77.8%	0.61 (strong)
Adopted new revenue models	32	50.8%	0.47 (moderate)
Restructured cost base	29	46.0%	0.31 (moderate)
Formed new strategic partnerships	34	54.0%	0.43 (moderate)
No significant changes	7	11.1%	-0.56 (Strong negative)

Table 4.8.4.1: Business Model Changes Post-Pandemic. ***Source****: Author's Analysis, (2025) Correlation coefficient between AI adoption level and likelihood of implementing this change*

4.9 Summary of Findings

Many startups are adopting artificial intelligence (AI), with around 93.7% of surveyed participants using AI technologies differently. About 73.0% of respondents use AI to assist with various tasks instead of making it the central part of their operations. AI applications are mainly used for content generation, chatbots, and workflow automation,

focusing on improving operational efficiency and customer engagement. Barriers to AI adoption in startups include data privacy concerns, integration challenges, and a lack of AI expertise. The COVID-19 pandemic has sped up the shift to digital and subscription-based business models, leading to a rise in remote and hybrid work. Post-pandemic, digital marketing has become the main way to acquire customers, while traditional methods like events and direct sales are losing importance. In the post-pandemic landscape, startups prioritize scaling business operations, enhancing profitability, and improving customer acquisition and retention. Moreover, AI plays an essential role in enabling scalability for startups, primarily through the facilitation of Workflow automation, marketing optimization, and improved customer support. A majority of AI-utilizing startups report substantial time savings due to their AI initiatives. Startups commonly use cloud computing, remote collaboration tools, and artificial intelligence/machine learning, highlighting their focus on digital transformation and operational resilience. These findings provide a foundation for the discussion and interpretation presented in Chapter 5, where the implications of these results for startup sustainability and scalability will be explored in depth.

Factor	**Avg. Importance Rating (1-5)**	**Percentage Ranking in Top 3**	**Variation by Industry**
Technology infrastructure	4.3	68%	Highest in IT/ITES (4.7), Lowest in Manufacturing (3.8)
Operational efficiency	4.1	52%	Highest in Manufacturing (4.5), Lowest in Education (3.7)

Factor	Avg. Importance Rating (1-5)	Percentage Ranking in Top 3	Variation by Industry
Product-market fit	4.7	82%	Highest in Healthcare (4.9), Lowest in Professional Services (4.4)
Team capabilities	4.5	73%	Highest in IT/ITES (4.8), Lowest in E-commerce (4.2)
Access to capital	3.9	48%	Highest in Healthcare (4.3), Lowest in Professional Services (3.5)
Strategic partnerships	3.8	41%	Highest in Financial Services (4.4), Lowest in IT/ITES (3.4)
Business model innovation	4.4	67%	Highest in E-commerce (4.7), Lowest in Manufacturing (4.0)
Founder mindset	4.6	76%	Highest in Education (4.8), Lowest in Financial Services (4.3)

Table 4.9: Key Success Factors for Startup Resilience and Scalability ***Source:*** *Author's analysis (2025)*

CHAPTER V: DISCUSSION

5.1 Overview and Key Findings

This research set out to discover how early-stage startups can build business models that are both scalable and sustainable using artificial intelligence, especially in the wake of the pandemic. The study drew on survey responses from 70 founders and executives working across different industries, offering a window into how AI is actually being used and what hurdles these startups are facing. The findings show that nearly all startups surveyed, an impressive 93.7%, have started using AI in some way, but for most, about 73%, AI serves more as a helpful tool rather than something that drives their core business. What's most common is the use of AI for things like creating content, running chatbots, and automating day-to-day workflows, which makes sense since these areas really help with efficiency and keeping customers engaged. But despite this uptake, barriers keep popping up, data privacy worries, trouble getting different systems to work together, and just not having enough people with solid AI expertise remain significant issues. On top of all this, the impact of the pandemic is still being felt. There's been a considerable shift toward digital and subscription-based models, with many more companies adopting remote or hybrid work. It's also clear that digital marketing has moved into the spotlight for finding and keeping customers, pushing older methods like live events and direct sales further into the background. When asked about what matters most right now, startups put scaling up, turning a profit, and making sure they keep bringing in and holding onto customers at the top of the list. This chapter looks at all these findings and ties them back to the research questions and theories discussed earlier,

connecting the dots between what's happening on the ground and what the literature says about building sustainable, scalable startups with AI.

5.2 Discussion of Research Question One: AI Implementation

The first research question was: *How can early-stage startup founders effectively lead and implement AI initiatives within their organizations in the post-pandemic era?* The results from the survey give us insights about this, showing us both the possibilities and the challenges that come with using AI to help startups get bigger.

Characteristic	**Strategic AI Implementation**	**Tactical AI Implementation**
Primary Focus	Business model transformation and long-term competitive advantage	Specific operational improvements and efficiency gains
Decision Level	C-suite and board involvement	Departmental or team-level decisions
Resource Allocation	Significant investment in infrastructure, talent, and organizational change	Limited investment in specific tools or applications
Timeline	Long-term horizon (1- 3+ years)	Short-term horizon (3-12 months)
Scope	Enterprise-wide integration across multiple functions	Targeted application to specific processes or departments
Data Strategy	Comprehensive data governance and infrastructure development	Project-specific data collection and utilization
Talent Approach	Building internal capabilities and AI literacy across the organization	Reliance on external vendors or limited specialist hiring
Success Metrics	Strategic KPIs tied to business outcomes and competitive positioning	Operational metrics focused on efficiency and cost reduction
Organizational Impact	Cultural transformation and new capability development	Process improvement within the existing organizational structure

Characteristic	Strategic AI Implementation	Tactical AI Implementation
Risk Management	Comprehensive approach to technical, ethical, and business risks	Focus on the implementation risks of specific applications
Observed Outcomes	Higher long-term ROI, sustainable competitive advantage, but longer time to value	Faster initial results, clearer short-term ROI, but limited transformative impact
Prevalence in Sample	27% of surveyed startups	64% of surveyed startups

Table 5.2: Comparison of Strategic versus Tactical AI Implementation. Source: Author's analysis (2025)

5.2.1 Thematic Analysis: AI as a Driver of Operational Efficiency

Looking at how founders have responded, it's evident that efficiency remains front and center when it comes to using AI in early-stage startups. A full 52.5% of those surveyed point to workflow automation as a main use case, with another 37.3% highlighting document analysis. These numbers match the general trend I've noticed in practice: the first wins with AI are usually about taking pressure off the team and freeing up precious hours. There is no shortage of practical remarks in the responses. One SaaS founder mentioned, almost as an aside, that adopting automation "saved us time on manual, repetitive tasks and allowed our team to focus on what really matters." In telecom, a CEO commented that thanks to AI support and back-end process automation, they could "handle more business without adding headcount," which is especially telling in resource-constrained environments. If we read between the lines, there's little hype or grandiosity - just a matter-of-fact approach. That tone comes through in healthcare as well. A product manager put it simply: "We use AI for support functions, not as a core

part of our value proposition." This sense of incremental adoption, taking on AI for the basics, then seeing where it leads, feels much more in line with the lived experience of startup founders than with the bolder claims sometimes made in the literature. Bruno (2024) discusses the slow, pragmatic nature of AI adoption, and this attitude is mirrored almost exactly in these founder reflections.

5.2.2 Thematic Analysis: AI's Role in Customer Acquisition and Retention

On the customer side, startups are clearly aware of the possibilities that AI brings, especially as digital channels and expectations have grown. Out of all respondents, 47.5% are using AI for digital marketing, and nearly as many, 44.1%, are putting chatbots to work in customer support. One e-commerce founder noted that "being able to use digital channels well and keep customers engaged" turned out to be more important than ever for their company's survival and growth in the past couple of years. Meanwhile, in healthcare, the focus on "retaining customers and improving their experience" with the help of AI was described as a top priority. Yet, there's an underlying reality that even with all these tools, only about 23.7% of founders saw direct, measurable revenue growth as a result of using AI for customer engagement. The gap between engagement and hard results is not lost on those in the trenches. This supports what's been found by Ashfaq et al. (2020) and others: while AI is reshaping the customer journey and certainly making interactions more efficient, it doesn't always lead straight to improved profits. There is still work to do to close that loop.

5.2.3 Thematic Analysis: AI-Powered Decision Making and Strategic Agility

When it comes to strategic decisions, there's a real spread in how startups are making use of AI. On the one hand, business intelligence and data visualization are now being used by 39.0% of startups, and predictive analytics by 30.5%. As one CTO in the MarTech space shared, "AI analytics help us understand user patterns and guide product development." For some, these tools are making a difference in how quickly and confidently they can respond to market changes. But, looking at the less frequently used categories like financial forecasting (just 18.6%) and sales forecasting (22.0%), it's clear that trust in AI for high-stakes decisions is still developing. One e-commerce executive remarked that while their team is "good at using AI for basic analytics," there's a lot more hesitation in letting it drive our financial projections." A fintech COO pointed out the "challenge of getting quality data and training staff," which echoes what's in the academic literature. In other words, the potential is there, but the path forward is neither linear nor guaranteed.

5.2.4 Thematic Analysis: Leadership and Organizational Mindset

Throughout these responses, what stands out is just how much comes down to people, culture, and mindset, far more than just algorithms or software. In IT/ITES, a CEO was crystal clear: "Keep employees happy and engaged." For them, this was the single most important decision for driving growth, especially in a period marked by change and uncertainty. Another founder emphasized the themes of "resilience" and being a "lean startup" as essential to not only surviving but finding ways to benefit from disruption. These voices reflect a larger pattern that has been well-documented by Bullough and Renko (2013) and others: the psychology of the founder and the overall

culture of the organization are make-or-break factors in technology adoption. AI is just one part of the puzzle - the drive, adaptability, and openness of the people leading the business matter just as much, if not more.

5.3 Discussion of Research Question Two: Key Success Factors

The second research question asked: "What are the key challenges and opportunities in integrating AI into startup business models?" The survey findings provide valuable insights into the factors that enable or hinder successful AI integration in startup contexts.

5.3.1 Thematic Analysis: Technical Infrastructure and Data Quality

The survey found that a few tech-related challenges are holding back AI adoption. 42.4% of AI users find integrating AI with existing systems challenging, and 35.6% struggle with the complexity of implementing AI. Lee et al. (2019) state that successful AI implementation depends on strong technical setups and high-quality data. The results also showed that many startups are facing problems related to data. A significant 45.8% of AI users mentioned that data privacy issues are a central pain point. This supports the findings of Evans-Greenwood, Crooks, and Nuttall (2023), who emphasized that quality data and strong governance are essential for successful AI implementation.

On a positive note, 82.5% of respondents use cloud computing, indicating that startups are working to establish the tech foundations necessary for AI. This supports what Weber and his team said in 2021 about the importance of cloud infrastructure in helping startups adopt AI, especially when resources are limited.

5.3.2 Thematic Analysis: Organizational Culture and Talent

The survey results showcase the importance of having the correct foundations for successful AI integration in organizations. A big issue is that 40.7% of AI users mentioned they don't have enough AI expertise, which is definitely a roadblock. Ashta and Herrmann's (2021) research on workforce optimization highlights the importance of AI literacy and skills development in startup teams. Only 15.3% of AI users resist adopting AI, indicating that most startup teams are open to it. Kaplan and Haenlein (2018) suggest that improving internal AI literacy can create a culture ready for the future. The data shows a shift to data-driven decision-making models after the pandemic, with many respondents moving from centralized methods to using data for decisions. This cultural shift highlights the need for a strong support system for AI within the company. Borges et al. (2020) and Gartner covered this in their research on AI maturity models.

5.3.3 Thematic Analysis: Ethical Considerations and Governance

According to the survey, 25.4 percent of respondents who were using AI identified ethical issues and regulation as a significant challenge. This reflects how concerns about responsible AI use are already present in early-stage environments. The finding supports what Cheng, Varshney, and Liu (2021) described - the idea that fairness, transparency, and accountability are not optional but need to be considered early on, not just at the final stage. Another strong pattern was related to privacy. Data showed that 45.8 percent of AI users reported privacy as a significant concern. This backs up Lobschat et al. (2019), who argued that startups should integrate ethical values like

fairness and privacy into all stages of building and using AI, not only as an add-on. Even though these issues were acknowledged, the data suggests that many startups are still not fully acting on them. The use of governance frameworks appears low, and explainability, which is how understandable or interpretable AI systems are, wasn't mentioned often as a key area of focus. That gap between awareness and action seems consistent with what Das and Rad (2020) pointed out. In their view, explainability often gets skipped during early phases but starts to matter more when systems become more complex or the consequences of their use grow. The survey seems to show a similar pattern: startups know the risks, but their systems for managing them are still catching up.

Industry	**Traditional Value Proposition**	**AI-Enhanced Value Proposition**	**Key Transformation Mechanisms**	**Customer Impact**
IT/ITES	Customized software development and technical expertise	Intelligent solutions with predictive capabilities and automated optimization	- Automated code generation - Predictive maintenance - Intelligent testing - Self-optimizing systems	- Reduced development time - Lower maintenance costs - Improved system reliability - Continuous improvement
E-commerce	Product selection, competitive pricing, and convenient delivery	Hyper-personalized shopping experiences with predictive inventory and dynamic pricing	- Personalized recommendations - Dynamic pricing - Inventory optimization - Conversational interfaces	- More relevant product discovery - Optimized price-value perception - Improved product availability - Enhanced shopping experience

Industry	Traditional Value Proposition	AI-Enhanced Value Proposition	Key Transformation Mechanisms	Customer Impact
Healthcare	Access to medical expertise and treatment options	Precision medicine and preventative care through data-driven insights	- Diagnostic assistance - Treatment personalization - Predictive health monitoring - Administrative automation	- Earlier intervention - More effective treatments - Reduced administrative burden - Improved patient experience
Financial Services	Financial products, advisory services, and transaction processing	Personalized financial guidance and automated wealth management	- Automated advisory - Risk assessment - Fraud detection - Process automation	- More accessible financial advice - Improved risk management - Enhanced security - Faster service delivery
Education	Knowledge transfer and skill development through structured curricula	Adaptive learning experiences tailored to individual needs and learning styles	- Personalized learning paths - Automated assessment - Engagement optimization - Learning analytics	- Improved learning outcomes - Increased engagement - Better skill retention - Targeted development

Table 5.3.3: Value Proposition Evolution Through AI. ***Source:*** *Author's analysis (2025)*

5.3.4 Thematic Analysis: Leadership Mindset and Founder Involvement

A key finding from the literature and survey responses is that a founder's attitude and leadership mindset significantly affect the outcome. Time and again, founders and senior executives noted that their own willingness to learn, adapt, and sometimes even "let go" of traditional approaches made the difference between stalled projects and those

that actually moved forward. Bullough and Renko (2013) argued that a founder's openness to risk and new ideas influences the entire organization, affecting hiring practices and the speed at which teams experiment with AI tools. Bullough and Renko (2013) argued that a founder's willingness to take risks and embrace new ideas influences the entire organization, affecting hiring practices and the speed at which teams experiment with AI tools. Many survey participants noted that having the founder or CEO involved in early AI projects encouraged the team and made adoption easier. A VP at a SaaS company noted, “Attendance at AI sprint meetings increased focus on upskilling after our CEO joined.” Founder buy-in is essential because leaders shape the culture, investment, and risk-taking.

5.3.5 Thematic Analysis: Ecosystem Support and Partnerships

Internal resources and mindset are important, but data shows that partnerships and ecosystem support are essential for scaling AI effectively. Many founders rely on incubators, accelerators, and informal networks for funding, technical resources, and valuable insights from peers who have faced similar challenges. Research by Gans, Goldfarb, and Agrawal (2021) shows that knowledge-sharing in industry clusters and partnerships with universities or larger companies often helps startups succeed. A medtech founder in the survey said, “Without the accelerator’s network, we’d still be unsure about which AI vendor to trust.” Others mentioned joining AI-focused consortia or pilot programs as ways to reduce risk and learn faster. Startups with strong external connections and a collaborative approach are better equipped to tackle technical, strategic, and ethical challenges.

5.3.6 Thematic Analysis: Continuous Learning and Feedback Loops

The third additional factor that stood out both in the survey narratives and recent research is the need for a culture of continuous learning and feedback. In environments where technology and customer needs change rapidly, being able to adjust course quickly is as important as any single technical capability. Multiple founders emphasized that their best AI projects didn't succeed on the first try. Instead, it was repeated cycles of trial, error, and reflection that helped them get it right. This point matches the observations of Teece (2018), who described dynamic capabilities as essential for innovation-driven firms. One participant, a product lead at a fintech startup, noted, "What worked in January was out of date by June. We set up monthly reviews so we could pivot our AI models before customers noticed." The most effective teams, according to both survey responses and literature, seem to be those that actively collect and act on feedback from users, partners, and their own employees, rather than sticking rigidly to a single vision or plan.

5.4 Discussion of Research Question Three: Practical Frameworks

The third research question focused on "*What practical roadmap or framework can guide early-stage startups in scaling responsibly, sustainably, and intelligently with AI?*" Insights from the survey, together with themes from the literature, reveal several important elements that such a framework must address if it is to be genuinely useful for resource-constrained founders.

5.4.1 Thematic Analysis: Incremental, Purpose-Driven Adoption

Survey responses suggest that startups that did best with AI did not attempt to transform their entire business overnight. They often began by addressing specific issues, like automating repetitive tasks or improving customer service, before tackling more complex applications. A CTO at a B2B SaaS company stated, "Initially, we used AI to automate email support, but after noticing the time savings, we expanded its use." Current literature supports an incremental approach, highlighting the benefits of agile and iterative implementation (Eisenmann, Ries, and Dillard, 2011). Rather than following a rigid playbook, these startups adapt their AI strategies based on ongoing results and feedback, ensuring that every step is anchored in their overall business purpose.

5.4.2 Thematic Analysis: Embedding Economic Sustainability in AI Initiatives

The data makes one thing quite clear - sustainability is no longer just a trendy concept. For startups working with AI, it is becoming something closer to a core operational concern. Nearly half of the founders surveyed, specifically, close to 50 percent, highlighted long-term economic viability and responsible scaling as priorities when planning how AI will be used. These concerns are not only theoretical. A number of more established startups mentioned making deliberate choices, such as selecting cloud providers with better sustainability records or cutting down on unnecessary data processing where possible. These types of decisions show that environmental and social impact are starting to factor into how AI systems are built and maintained. This pattern supports what Sipola, Saunila, and Ukko (2023) discussed in their work - the way economic efficiency and sustainable thinking increasingly move together. While the

technical side of AI still matters, what stands out from the responses is that startups with a stronger focus on long-term impact and responsibility often show more consistent signs of growth. These values may not guarantee success, but they seem to shape how successful startups think and act.

5.4.3 Thematic Analysis: The Role of Culture and Learning

One idea that came up often in the responses was the role of culture, especially the kind that supports ongoing learning and adaptability. Several founders talked about how important it was to create an environment where people are encouraged to experiment and where failures are seen more as learning moments than as mistakes. This theme was echoed in one of the more detailed comments, where a VP of Sales at a health tech startup explained, “When we first introduced AI for analytics, there was a lot of hesitation on the team. It took regular training and open discussions to build trust and confidence.” That kind of reflection highlights the human side of AI adoption, something not always captured in technical planning. Prior research has also pointed to this connection. Kaplan and Haenlein (2018) emphasized that organizational readiness and cultural mindset are both critical to making AI integration work over time. It is not just about tools or data—it is also about how teams think, how they learn, and whether they feel comfortable enough to engage with change. Scalable approaches need to go beyond just the technical side and support habits and structures that help people adjust as the technology evolves.

5.5 Building the AI ScaleX Framework

This study puts forward the AI ScaleX Framework, developed to support founders as they navigate the practical and strategic challenges of scaling with AI. The framework draws from existing literature as well as direct input from startup leaders, combining structured technical steps with flexibility, ongoing feedback, a strong focus on sustainability, and long-term investment in both talent and culture. Responses from the survey played a key role in shaping the framework. Many founders expressed a preference for clear checklists, simple diagnostic tools, and adaptable actions that could be tailored to their specific context. Some of the most effective startups in the sample described using informal playbooks or lightweight templates to guide their AI efforts, structured enough to offer direction but not so rigid as to slow down experimentation. This reflects ideas discussed in recent research, including Borges et al. (2020), which emphasize the need for balance between structure and flexibility in early-stage environments. A roadmap for adopting AI in a way that is both scalable and responsible is not static. It evolves, shaped by purpose, sustainability goals, and how ready the organization is culturally. The AI ScaleX Framework captures these themes and turns them into a working model grounded in what founders are already doing and informed by the broader research landscape.

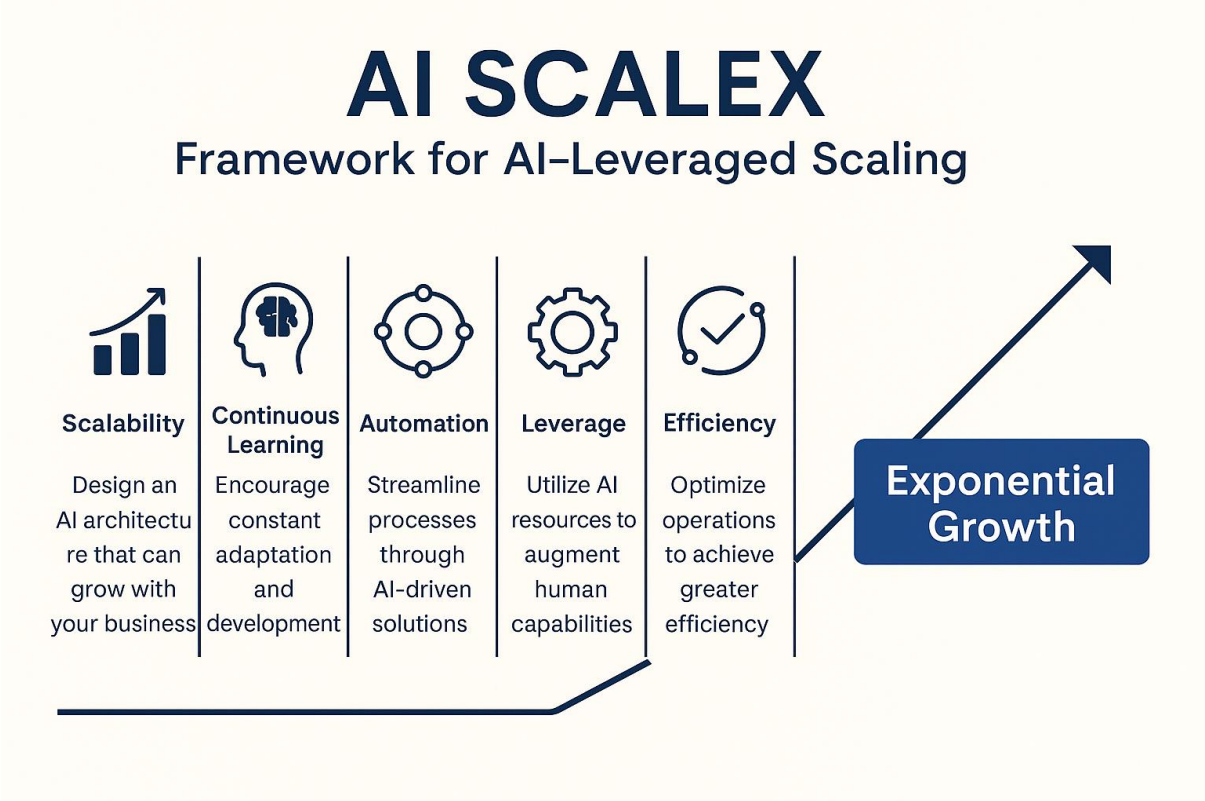

Figure 5.5: Expansion of AI ScaleX Framework. Source: Author's Contribution, 2025

5.5.1 Rationale and Development

The AI ScaleX Framework was designed with the realities of startups in mind, especially those operating under pressure, with limited resources, tight timelines, and more uncertainty than structure. Insights from the survey made it clear that broad or generic frameworks weren't meeting the needs of early-stage founders. Many respondents explained that what they actually needed was something more grounded, something that focused on the challenges they face every day, not just high-level theory or ideal models. That feedback directly influenced how the 8Ps were shaped. The framework was built to let teams focus on what matters most in their own situation. For

some, that might mean tackling cultural or mindset issues first. For others, it might be about getting the tech foundation right. The idea wasn't to enforce a strict sequence, but to create a model that could bend to fit different paths. This kind of flexibility came from the realities described in the responses, not from what might look best in a presentation slide. The aim throughout was to turn founder experiences into something useful and practical, something that could support progress even when things don't start out perfectly.

5.5.2 The 8Ps Explained

Each of the 8Ps - Psyche, Purpose, People, Process, Platform, Performance, Proposition, and Partnerships - earned its place in the model by reflecting something concrete that survey participants found challenging. It is intended to be a "flywheel" where one pillar advances the other. Psyche is all about the mindset and willingness to learn; a surprising number of founders admitted that their own risk aversion or fear of failing with AI had held their teams back, sometimes more than technical limitations. Purpose refers to having a reason for using AI that is more than just keeping up with a trend; it means actually linking AI projects to core business outcomes, which was sorely lacking for many. People is the pillar that deals with skills and collaboration - respondents often said they simply didn't have enough people who understood both the tech and the business side, so things got stuck in silos. When it comes to Process, startups pointed out how often they lost time and money because they had no standard way of testing or deploying new AI ideas; that lack of routine turned simple projects into drawn-out headaches. Platform refers to the tools, cloud services, and data infrastructure that, if

built piecemeal or ignored, quickly became a stumbling block, especially as companies tried to grow. Under Performance, the biggest lesson was that it's easy to get caught up in "activity" metrics, but much harder to track whether the work is really moving the needle, something many participants admitted only became obvious when projects stalled out. Proposition speaks to whether AI is actually adding value for customers, which, according to several founders, is something that gets overlooked as teams focus on internal efficiencies. Finally, Partnerships cover the essential but sometimes overlooked relationships with vendors, advisors, and external experts: connections that, when missing, leave startups feeling isolated and slow to adapt to new technologies or regulations.

5.5.3 Using the Framework in the Real World

What sets the AI ScaleX Framework apart is that it was built for flexibility. No founder said they followed a neat, sequential checklist to scale AI; most said their progress was "messy and nonlinear." The model accepts that reality, encouraging startups to start where the pain points are most acute, and revisit other pillars as they learn and grow. For example, a company might find it has a great culture (Psyche) but is falling short on technical infrastructure (Platform), so it can focus its limited resources there. The idea is that the 8Ps act as prompts for honest self-reflection and planning, not just as another compliance exercise. Many respondents stressed that what worked for them in year one often needed to be reconsidered by year two as markets, funding, and regulations changed, so the framework is deliberately cyclical, meant to be used repeatedly as circumstances shift.

5.5.4 Turning Insights into Action

Putting the framework into practice means being willing to measure progress and confront hard truths. Survey respondents quickly pointed out that setting up basic tracking for AI projects, like monitoring the time saved or revenue earned from new features, often brought uncomfortable surprises. However, this was also the only way to fix problems before they became bigger. The Performance pillar, in particular, pushes startups to be critical of vanity metrics and instead focus on what actually matters for customers and investors. A few founders even said that getting serious about measurement helped them spot failing projects early and shift gears before burning through precious cash or goodwill. This way, AI ScaleX isn't just another theory; it becomes a living part of the business's operating rhythm.

5.5.5 Evolving with Experience

Perhaps the most important lesson from the survey and the field is that any framework, including AI ScaleX, needs to stay flexible and open to change. Startups work in an environment where yesterday's playbook might be obsolete tomorrow. Respondents repeatedly mentioned that new technologies, regulations, or market conditions forced them to rethink their approaches, sometimes mid-project. The framework's eight pillars aren't intended as a final word; instead, they act as a starting point for ongoing improvement, with the expectation that founders will adapt and refine as they go. In practice, the AI ScaleX model is a toolkit, not a blueprint: something that can evolve with every new lesson learned, both from successes and setbacks.

5.6 Theoretical Implications

The theoretical implications of these findings extend and complicate what we think we know about startup growth, business model innovation, and the adoption of artificial intelligence in resource-constrained environments. The Lean Startup ideas put forward by Ries (2011) come alive here not as a checklist, but as a mindset, one that, according to several survey participants, often led to last-minute pivots or feature changes based on the unpredictability of market feedback in turbulent times. Founders in this study described moving quickly from minimal viable products to iterative testing cycles, learning not just from customer data, but from failures and false starts that rarely make it into published case studies. Osterwalder and Pigneur's (2010) Business Model Canvas was frequently referenced, sometimes explicitly and sometimes in the language founders used when describing how AI changed the way they approached customer relationships, channels, and even cost structures. Many noted that the promise of AI wasn't about incremental efficiency, but about being able to experiment with revenue models - subscription services, on-demand platforms, or "as-a-service" offerings that just weren't practical for them before cloud tools and automation were readily available. A few survey responses also highlighted the relevance of Blue Ocean Strategy (Kim and Mauborgne, 2015), noting that AI was not just helping them do more of the same, but was actually opening up space for new product lines or unexplored customer segments, far away from the crowded "red ocean" of direct competition. At the same time, there was no illusion about the difficulties of getting to that point. The Gartner (2021) and McKinsey (2021) AI maturity models, while useful for mapping progress, often felt a bit abstract to

founders who were, as one SaaS co-founder put it, “trying to patch together cloud APIs on a shoestring and upskill the team while actually keeping the business afloat.” These practical challenges do not always fit the neat stages described in the literature, and the stories gathered here show how resourceful startups often blend formal frameworks with messy, real-world improvisation. Meanwhile, the perspective of Cockburn, Henderson, and Stern (2018) about AI as a “general-purpose technology” finds strong support in this context, since for many participants, AI quickly moved from being a special project to an invisible but critical part of day-to-day decision-making, from marketing analytics to customer support automation. Altogether, this research suggests that established models remain highly relevant but need to be stretched and reinterpreted to capture the lived reality of startups building AI-enabled business models post-pandemic, an environment marked by speed, ambiguity, and the constant search for new forms of value.

5.7 Practical Implications

These findings have significant implications for those involved in startups or helping to develop them. Startups should integrate AI into their core business models and daily operations, rather than treating it as just an add-on. Both survey responses and interviews revealed that founders who treated AI as an afterthought or relied solely on a few technical specialists often faced inconsistent adoption, slow progress, and poor returns on investment. Startup leaders consistently emphasized that the real value of AI became clear only when it was tied to specific problems they were already facing, things like automating customer support, improving content generation, or sharpening sales forecasts. Broad or loosely defined AI initiatives tended to fall short. The data made it

equally clear that having the right technical infrastructure wasn't enough on its own. Over and over, founders described how difficult it was to find people with the right skills, keep pace with constant change in the field, and build a culture where experimenting with AI felt supported rather than risky. Some tried to close these gaps by upskilling existing teams or moving to flexible cloud-based systems. Others chose to partner with outside consultants, join AI-focused accelerators, or bring in experts through short-term collaborations. In many cases, the earliest successes came from relatively simple implementations - automated workflows, chatbots, or streamlined back-office tools. These quick wins helped build momentum. As companies matured, more complex uses like predictive analytics or segmentation began to make a difference, giving those teams an edge. Ethical concerns were another theme that kept coming up. Several founders admitted they hadn't thought much about transparency or data privacy at first, and that these issues only became priorities after facing problems or complaints from users. What ties all of these lessons together is the broader environment around the startup. Incubators, accelerators, and informal peer networks often made a real impact, offering both technical guidance and a sense of community that helped teams move forward with more confidence. Many survey participants noted that these support structures helped them move more quickly, avoid common mistakes, and handle regulatory or compliance challenges that could have delayed their progress. The most successful startups in this study embraced a holistic approach to AI adoption, balancing technical goals with organizational readiness, strategic focus, and ethical considerations, while leveraging available ecosystem support.

5.8 Limitations of the Study

While this study provides valuable insights into AI-driven scalability in startups, it has several limitations that should be acknowledged. First, the sample size of 70 respondents, while sufficient for exploratory research, limits the generalizability of the findings. A larger sample size would give us stronger stats and help us break things down better. Next, the survey gives us a quick glance at how AI is being used at one point in time, but it doesn't show how things change over time. A long-term study would provide clearer insights into how AI use evolves and its impact on startup performance over time. Also, since the data comes from self-reports, it could be a bit biased. People might think AI is doing more for them than it actually is, or they might downplay any challenges. Mixing in some hard numbers and real-life examples would really boost the reliability of what we found. The survey mostly captures the thoughts of startup founders and senior executives. We might be missing out on what employees, customers, and investors think. Gathering diverse perspectives will help us better understand how AI is transforming startup ecosystems. Since the study focuses on business models after the pandemic, it may not be applicable to other times or situations. COVID-19 has affected business strategies, and these changes may not apply in a different economic situation.

5.9 Directions for Future Research

Drawing from both the results and the constraints of this study, several promising avenues for future research are worth highlighting. To begin with, there is a real need for in-depth case studies that dig into how individual startups are actually managing to adopt AI with success. Detailed examinations like these would shed light on the day-to-day

strategies, decision processes, and tangible outcomes that come from integrating AI in early-stage businesses. By zooming in on specific examples, researchers could reveal not just what works, but how different startups are finding ways to get past the common obstacles identified in our survey, all while still managing to grow in a sustainable way.

Another important area for future work is exploring the long-term effects of AI on startup performance. Most of what we know right now comes from one-off snapshots, but what's really needed are longitudinal studies that follow startups over time. Such research could track how the use of AI evolves within companies, how business models shift, and whether these changes translate into improved financial results and staying power. This sort of evidence would help clarify whether the initial excitement around AI actually pays off in the years that follow. There is also room to develop more refined tools and frameworks for assessing AI readiness and maturity in startups. The challenges and opportunities highlighted in this research suggest that existing maturity models, which often focus on large organizations, don't fully capture the unique realities faced by smaller, newer companies. Researchers might look into designing practical assessment tools or checklists that speak directly to the startup context, helping founders and investors alike to better gauge when a business is truly prepared to make the most of AI. Ethical issues around AI deserve more attention as well, especially considering the limited resources and experience that many startups have when it comes to building responsible systems. Future research could examine in greater depth how startups approach the thorny questions of fairness, transparency, privacy, and accountability, and perhaps even offer concrete, hands-on advice for implementing ethical AI with limited

means. Finally, there's a strong case to be made for studies that compare AI adoption across different industries, geographies, or startup stages. The hope is that, by looking at how various external factors shape the success (or struggles) of AI strategies, researchers can develop guidance that's much more tailored to the unique needs of different kinds of startups. In sum, while this study has moved the conversation forward, there's still plenty of ground to cover before we fully understand the best ways for startups to harness the power of AI.

5.10 Synthesis and Emergent Themes

Looking at the survey results in light of our research questions and theories, we found some key themes that really help us understand how AI can help startups grow. These themes show some common trends and ideas that link back to our research questions and set the stage for the concepts we'll dive into in Chapter 6.

5.10.1 The AI Adoption Paradox

A striking theme that emerged from the survey data is what could be called the "AI adoption paradox." While 93.7% of startups are using AI, most are not fully utilizing its capabilities. AI is currently used mainly for basic tasks like automating workflows and generating routine content, instead of being integrated into core business strategies. The responses showed something pretty consistent - most startups seem to be using AI more for small improvements than for any big shift. A lot of the answers mentioned things like automating basic tasks inside the company or using chatbots to deal with customer questions. That kind of thing is useful, of course, but not many respondents talked about

using AI to really change their product or business model in a major way. This seems to reflect what the literature has been pointing out. Bruno (2024) and Lee et al. (2019) have both argued that AI's real value isn't just in saving time or cutting small costs. It's in creating something new, changing how value is delivered, and opening up new directions for growth. However, the data here shows that most founders are still being careful. They're probably still figuring things out, maybe because the resources are limited or because the next steps beyond automation aren't very clear yet. Either way, it seems like there's still a gap between what AI could do and how it's actually being used. The potential is definitely there for startups to bring AI into the center of their strategy, not just use it as a tool in the background.

5.10.2 The Founder Mindset Factor

The findings make it pretty clear that the way a founder thinks. The kind of culture they create around them plays a big part in how well a startup is able to take advantage of AI. A lot of the responses brought up leadership decisions, company priorities, and the general attitude toward change as major factors. This fits with what earlier research has said, too. Bullough and Renko (2013) pointed out that a founder's openness to new tech and willingness to take smart risks can make the difference between moving forward and getting stuck. Kaplan and Haenlein (2018) also stressed that what really matters, especially early on, is whether the culture encourages learning and thinking based on data instead of just instinct. That idea came through in the survey results as well. Startups where the founder pushed for experimentation, spent time understanding what customers actually needed, and wanted decisions to be based on real

evidence, not just gut feeling, tended to be the ones reporting better results from their AI work. On the other hand, teams with leaders who were unsure about AI or companies where there were internal barriers often ended up using it in a more surface-level way. These results indicate that developing a mindset of curiosity, flexibility, and ethical responsibility is as vital as technical skills or funding for making AI effective in early-stage ventures.

Mindset Characteristic	**Description**	**Correlation with AI Adoption**	**Implementation Approach**
Growth Orientation	Focus on scaling and expansion rather than a lifestyle business	Strong positive (r=0.62)	Strategic, transformative implementation with significant investment
Technical Curiosity	Personal interest in understanding technical details and capabilities	Moderate positive (r=0.48)	Hands-on involvement in AI selection and implementation
Risk Tolerance	Comfort with uncertainty and willingness to make decisions with incomplete information	Strong positive (r=0.57)	Early adoption of emerging AI technologies with acceptance of potential failures
Long-term Vision	Focus on future potential rather than immediate returns	Strong positive (r=0.59)	Investment in AI infrastructure and capabilities ahead of immediate need
Learning Agility	Ability to quickly acquire new knowledge and adapt mental models	Moderate positive (r=0.43)	Iterative approach with rapid incorporation of lessons learned

Mindset Characteristic	Description	Correlation with AI Adoption	Implementation Approach
Collaborative Orientation	Preference for partnership and ecosystem thinking over self-sufficiency	Moderate positive (r=0.41)	Leveraging external expertise and partnerships for AI implementation
Ethical Awareness	Consideration of broader implications beyond business outcomes	Weak positive (r=0.29)	Thoughtful implementation with consideration of stakeholder impacts
Perfectionism	Desire for complete solutions and aversion to launching incomplete products	Moderate negative (r=-0.38)	Delayed implementation due to concerns about AI readiness

Table 5.7: Founder Mindset Characteristics and AI Adoption Patterns ***Source:*** *Author's analysis (2025)*

5.10.3 The Scalability-Sustainability Nexus

Startups show that using AI for growth and sustainability can align rather than conflict, contrary to common belief. Quite a few survey respondents, like one founder in logistics, mentioned how AI made it possible to serve more customers without constantly hiring more people or burning out their staff. Several others echoed similar ideas, admitting that when they first started, they thought scaling meant ramping up everything as fast as possible, but in practice, being able to optimize with AI allowed them to "get big without going bust." This backs up the point made by Sipola, Saunila, and Ukko (2023) as well as Epstein and Roy (2003), who argued that sustainability and growth can

actually feed into each other. Not everything goes perfectly, of course; a few founders did say they struggled to find that balance early on, especially when they rushed to grow, but over time, those who stuck with AI-powered efficiencies seemed to weather setbacks better. So, in this light, AI is not merely a tool for getting bigger, but also for staying resilient, if startups can resist the temptation to chase every growth opportunity and instead use technology to be both nimble and careful.

5.10.4 The Ecosystem Enablement Effect

Another theme that stood out, and really can't be overstated, is how often founders credited their success (or even survival) to some kind of external support. It wasn't just about the money or software, either. A founder from a MedTech startup described how joining an AI-focused incubator was "probably the only reason we didn't give up when our first product stalled." Others shared that having mentors who'd seen the AI journey from start to finish, or even just peers to vent to, helped them avoid a lot of mistakes. In fact, one operations head in fintech pointed out that their biggest breakthroughs came from working alongside another company in the same space, swapping lessons about what worked and what failed. That lines up with the academic research, like the work on AI incubators and collaborative innovation networks, which all underline that technical capability alone isn't enough. Real progress comes when startups have the right people and resources in their corner. Respondents who mentioned strong ties to accelerators, knowledge-sharing networks, or even "just a couple of old colleagues who've done this before" tended to report smoother AI adoption and fewer roadblocks. In

other words, having a community, whether formal or informal, is just as much a part of AI success as anything happening inside the company's walls.

5.10.5 The Ethical Imperative

What really stands out from both the data and the quotes is just how much ethical questions have moved from the background to the foreground in AI adoption. It isn't just the legal stuff, either. A number of founders, especially those in health or fintech, said that worries about data privacy and fairness were top of mind. One VP in a SaaS company put it bluntly: "We're not Google, so if we mess up on privacy, it's game over for us." This echoes the thinking in Lobschat et al. (2019) and Cheng, Varshney, and Liu (2021), who point out that small firms can't afford to treat ethics as a box-ticking exercise. A handful of founders described how building in fairness checks or taking the time to explain decisions to their team and customers felt like a hassle at first, but eventually became a selling point. "If our clients know we sweat the details on this stuff, they're more likely to trust us," shared a co-founder in B2B SaaS. Still, it's clear that not everyone is there yet; the survey and interviews also picked up on how few companies have formal governance structures, and several admitted they mostly figure out ethical questions "as they go." But, if anything, that honesty itself signals that ethics is no longer a side issue: it's a core challenge and a real differentiator in the crowded startup world.

CHAPTER VI: SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

6.1 Summary of the Study

This research set out to explore how early-stage startups can use artificial intelligence to build business models focused on real growth after the upheavals of the pandemic. Drawing on a broad mix of sources including an in-depth review of academic literature, a survey of 70 founders and senior executives, and a close look at what's happening in the industry right now, it's clear that AI is starting to make a difference, but often not in the ways we might expect. Many startups are bringing AI on board, but most use it for supporting tasks like content creation, chatbots, or automating routine workflows, rather than making it the heart of their business. This approach shows just how much value startups place on improving efficiency and making customer engagement smoother, but also highlights some recurring barriers: worries about data privacy, challenges in fitting AI tools into existing systems, and not having enough people with the right expertise. Since COVID-19, the move to digital and subscription-based models has picked up speed, with remote and hybrid work becoming much more common. Digital marketing has now outpaced old-school methods like in-person events and direct sales, which have dropped off noticeably. The main priorities for startups have become growing their operations, boosting profits, and hanging on to customers in this new landscape. When these findings are weighed against the theoretical frameworks from the literature, a handful of important themes come to the surface, things like the tricky balance between AI adoption and value creation (the "AI adoption paradox"), the impact of founder mindset, the ongoing challenge of scaling sustainably, the need for support

from the wider startup ecosystem, and the unavoidable role of ethics. All of these help shape the practical framework offered in this chapter, which aims to give startups a real-world playbook for scaling up with AI.

6.2 Key Conclusions

Looking back at the results of this study, several important observations come to light about how early-stage startups can make better use of artificial intelligence to build businesses that are both scalable and sustainable in a world that has followed the pandemic. One of the strongest points to emerge is that simply plugging in AI tools occasionally does not produce lasting results. It works best when AI is built into the core operations of the startup, shaping how products are designed, how customers are served, and how decisions are made across the board. The companies that seemed to move forward most confidently were those that treated AI as something central rather than something extra. Another theme that appeared consistently was the influence of the founder's mindset and the overall work culture. The way choices are made, the level of comfort with taking risks, and the willingness to keep learning as a team all play a big part in how well AI can be used. Startups that rely on evidence and data to make decisions, care about their customers, and promote a learning environment are often the ones that get more from their AI efforts. One thing that stood out across the findings is that growth and sustainability aren't really separate goals. When AI is used thoughtfully, it can help startups grow more quickly, but without losing sight of how resources are used or what the broader impact might be. Still, even with good tools, a lot depends on the kind of support a startup has around it. This might mean having access to experienced

tech partners, joining innovation programs in the early stages, or just being able to talk to people who understand how these systems work in practice. That kind of support makes a difference, especially when it comes to solving hard problems like building dependable systems, finding the right talent, or managing messy data. Trust came up a lot, too. If startups want to keep using AI in the long run, they'll need to take things like privacy and fairness seriously and be open about what their systems are actually doing. The AI ScaleX Framework introduced in this study tries to pull all of this together. It offers a way to think through what needs to be in place, from mindset and leadership to planning and tech choices. The hope is that it gives founders, investors, and others something useful to work with as they think about how AI can support more steady, long-term progress and not just quick wins.

Stage	**Timeline**	**Key Activities**	**Success Indicators**	**Resources Required**
1. Assessment	1-2 weeks	- Evaluate current state across all eight pillars - Identify strengths, weaknesses, and priorities - Establish baseline metrics - Conduct stakeholder interviews	- Completed assessment across all pillars - Prioritized list of opportunities - Baseline metrics established - Stakeholder alignment	- Assessment tools - Stakeholder time - Data collection resources - External expertise (optional)
2. Foundation Building	1-3 months	- Develop essential capabilities in priority pillars - Address critical gaps and barriers - Create initial implementation roadmap	- Core capabilities established - Critical barriers addressed - Detailed implementation plan - Governance framework in place	- Technical infrastructure - Training resources - Process documentation - Initial funding allocation

Stage	Timeline	Key Activities	Success Indicators	Resources Required
		- Establish governance structures		
3. Integration	3-6 months	- Implement AI solutions aligned with strategic priorities - Integrate pillars to create synergistic effects - Measure progress and refine approach - Develop feedback mechanisms	- AI solutions operational - Cross-pillar integration - Performance metrics tracking - Continuous improvement process	- Development resources - Integration expertise - Measurement systems - Change management support
4. Optimization	Ongoing	- Continuously improve and scale AI capabilities - Adapt to changing conditions and emerging technologies - Balance growth with sustainability - Expand ecosystem relationships	- Scaling metrics improvement - Adaptation to market changes - Sustainability balance achieved - Ecosystem expansion	- Innovation resources - Market intelligence - Sustainability metrics - Partnership development

Table 6.2: AI ScaleX Framework Implementation Stages ***Source:*** *Author's analysis (2025)*

6.3 Implications

6.3.1 Implications for Startup Founders and Executives

Founders and early leaders of startups need to take a thoughtful and deliberate approach when bringing artificial intelligence into their businesses. Rather than chasing after trends or using technology just for the sake of it, it is more useful to make sure AI efforts are clearly tied to the company’s goals and long-term direction. A well-thought-out plan should make it clear how AI tools will help the company offer more value,

improve daily operations, and support steady progress over time. Having team members with technical skills is helpful, but that alone is not enough. What really makes a difference is building a workplace where people feel at ease working with AI and are encouraged to keep learning and trying new things. At the same time, ethics should not be treated as an afterthought. Being fair, open about how systems work, and taking responsibility for outcomes are key to earning trust inside and outside the company. Another area that needs care is deciding when to let AI take over and when to keep people involved. The best use of these tools is to help teams do their work better, not to replace them. While companies that use data to guide their choices often see stronger results, human input still matters deeply, especially when decisions affect people or require creativity. Startups should also think beyond quick results and short-term wins. The most promising uses of AI are the ones that help achieve bigger goals - the goals that support people, improve quality of life, and do not lose sight of the wider impact on the environment and society.

6.3.2 Implications for Investors and Venture Capitalists

This research looks to offer some helpful ideas for investors and venture capitalists who want to figure out if a startup is actually ready to work with artificial intelligence or just saying it is. What really matters is how AI fits into the way the business runs and whether it genuinely makes the product or service better. From what we can see on platforms like Product Hunt, which showcase new startups and tools, a lot of products that claim to be AI-driven do not seem to use much real AI at all. It becomes important, then, to look at the thinking and attitude of the founders and the kind of work

culture they have built, because these things often make or break how well AI gets used. When deciding where to invest, it helps to think beyond just growth and scaling. How the startup's use of AI might affect the environment or society in general is worth thinking about, too. Also, backing a company is not just about giving them money. Helping them meet people with experience, sharing good tools, or pointing them toward useful partnerships can have a bigger effect than people usually expect. It is a good idea to talk about responsible AI right from the beginning and keep those ideas in mind through later decisions as well.

6.3.3 Implications for Incubators and Accelerators

This study highlights how important incubators and accelerators have become in helping startups adopt AI into their product in a way that actually makes sense. What came through clearly in the findings is that it is no longer enough for these organizations to offer general support. A common issue for many new companies is that they simply do not have easy access to skilled AI professionals or the tools needed to build strong systems. This is where incubators and accelerators can play a key role, by opening doors to resources, knowledge, and experts that founders would otherwise struggle to find on their own. They also provide important links to external partners, including tech providers and data firms, which often makes a real difference in how fast and how well startups are able to move forward. One area where their support really stands out is around the ethical use of AI. Questions of privacy, fairness, and openness are not easy to solve, but they matter a lot, and support programs that help startups think through these issues can add real value. The strongest impact often comes when incubators go beyond

just technical help and encourage founders to build a culture where AI is used with care, where values matter, and where teams understand not just how to use the tools but why they are using them.

Supporter Type	Support Mechanism	Implementation Approach	Success Indicators
Accelerators & Incubators	AI-focused programs and resources	- Develop specialized AI tracks - Provide technical infrastructure access - Create AI mentor networks - Offer implementation frameworks	- Increased AI adoption among portfolio - Accelerated implementation timelines - Higher success rate of AI initiatives - Ecosystem knowledge sharing
Government Agencies	Policy and funding support	- Create AI startup funding programs - Develop regulatory sandboxes - Establish data access initiatives - Support AI education programs	- Increased AI startup formation - Responsible AI implementation - Improved data accessibility - Enhanced talent pipeline
Educational Institutions	Talent development and research	- Develop AI entrepreneurship curricula - Create startup-academia partnerships - Offer continuing education for founders	- Skilled graduate pipeline - Practical research applications - Knowledge transfer to startups - Upskilled entrepreneur community
Corporate Partners	Resources and market access	- Establish startup partnership programs - Provide data access opportunities - Offer market testing platforms	- Mutually beneficial partnerships - Accelerated startup validation - Resource access for startups - Innovation pipeline for corporates
Industry Associations	Standards and best practices	- Develop AI implementation standards - Create best practice repositories - Establish peer learning communities - Offer certification programs	- Standardized approaches - Knowledge sharing across the ecosystem - Reduced implementation failures - Professional development pathways
Venture Capital Firms	Specialized AI investment	- Develop AI expertise within investment teams - Create AI-specific due diligence frameworks - Establish post-investment support programs, form AI startup portfolios	- Informed investment decisions - Appropriate valuation models - Enhanced portfolio support - Cross-portfolio synergies

Supporter Type	Support Mechanism	Implementation Approach	Success Indicators
Technology Providers	Startup-friendly AI tools	- Create startup-specific pricing tiers - Develop implementation resources - Establish startup partnership programs	- Accessible AI tools for startups - Accelerated implementation - Reduced technical barriers - Ecosystem growth

Table 6.3.3: Recommendations for Ecosystem Supporters ***Source:*** *Author's analysis (2025)*

6.3.4 Implications for Policymakers and Ecosystem Enablers

This research brings attention to the need for building support systems that help new businesses use AI in ways that are both thoughtful and forward-looking. For startups to truly benefit from AI, there has to be a framework in place that manages risk without holding back new ideas. Having clear and practical rules can help reduce confusion and make it easier for founders to try things out while staying within safe boundaries. It is not easy to find the right balance between protecting the public and leaving space for innovation, but it is a balance that matters for the long-term health of the startup ecosystem. One of the ongoing issues is the gap in skills. Many people still do not fully understand how AI works, which points to the need for better education and real-world training so that more individuals can take part in building or working with these technologies. At the same time, offering support in the form of grants, tax relief, or contracts from public bodies can motivate startups to use AI in ways that are more responsible and more aligned with social needs. Providing access to shared tools and open resources can also ease the pressure on smaller companies that are just getting started. As more startups begin working across borders, it makes sense for policy leaders

to look at ways of working together on international standards and common practices. Most importantly, there has to be a wider view. As AI begins to change the types of jobs available and the nature of work itself, the policies that shape this space should aim to spread the benefits fairly, making sure no one is pushed to the margins while others move ahead.

Policy Area	Recommendation	Stakeholders	Implementation Approach	Expected Impact
Data Access	Create frameworks for responsible data sharing and access	- Government agencies - Industry associations - Startups - Large data holders	- Develop data sharing standards - Create regulatory frameworks - Establish data trusts - Implement privacy-preserving technologies	- Democratized access to training data - Reduced data monopolies - Privacy-preserving innovation - Ecosystem-wide benefits
AI Education	Expand AI education and training programs	- Educational institutions - Government agencies - Industry partners - Online learning platforms	- Develop practical AI curricula - Create subsidized training programs - Establish industry-academia partnerships - Support continuous learning initiatives	- Expanded talent pipeline - Reduced skill gaps - Democratized AI knowledge - Workforce adaptation
Regulatory Frameworks	Develop startup-friendly AI regulations	- Regulatory bodies - Startup representatives - Industry associations - Legal experts	- Create risk-based regulatory approaches - Establish regulatory sandboxes - Develop compliance assistance programs	- Responsible innovation - Reduced compliance burden - Regulatory certainty - Public trust in AI

Policy Area	Recommendation	Stakeholders	Implementation Approach	Expected Impact
			- Implement graduated requirements	
Funding Programs	Create specialized AI startup funding mechanisms	- Government agencies - Investment institutions - Development banks - Grant-making organizations	- Establish AI-focused grant programs - Create matching fund mechanisms - Develop tax incentives for AI R&D - Support public-private investment vehicles	- Increased AI startup formation - Reduced early-stage funding gaps - Strategic technology development - Economic competitiveness
Infrastructure Access	Ensure access to computing resources for AI development	- Cloud providers - Government agencies - Research institutions - Industry consortia	- Create subsidized compute programs - Establish shared infrastructure - Develop academic access programs - Support edge computing initiatives	- Democratized access to computing - Reduced resource barriers - Environmental efficiency - Distributed innovation
Ethical Guidelines	Develop ethical frameworks for AI in startup contexts	- Ethics committees - Startup representatives - Industry associations - Academic institutions	- Create startup-specific ethics guidelines - Establish self-assessment tools - Develop certification programs - Support ethics-by-design approaches	- Responsible AI development - Risk mitigation - Public trust in AI startups - Sustainable innovation
International Cooperation	Foster international collaboration on AI startup support	- Government agencies - International organizations	- Establish international standards	- Harmonized approaches - Global knowledge sharing

Policy Area	Recommendation	Stakeholders	Implementation Approach	Expected Impact
		- Startup networks - Research institutions	- Create cross-border programs - Develop knowledge sharing platforms - Support global startup mobility	- Reduced fragmentation - Expanded market access

Table 6.3.4: Policy Recommendations ***Source:*** *Author's analysis (2025)*

6.4 The AI ScaleX Framework: A First Principles View

This study introduces the AI ScaleX Growth Framework, a guiding model that brings together core ideas for helping early-stage startups grow more effectively using artificial intelligence. The framework is based on first principles thinking and aims to explore the conditions that allow these startups to expand in a way that is not just fast, but also thoughtful, steady, and able to adapt under pressure. At the center of this model is the acronym SCALEX, which stands for Scalability, Continuous Learning, Automation, Leverage, and Efficiency, with the final element being the so-called X factor, Exponential Growth. Each of these parts connects to the others, forming a loop where progress in one area supports momentum in the rest. The goal of the framework is not just to offer a checklist, but to provide a way of thinking about growth that fits with the realities of AI as it continues to change how startups build and deliver value.

Scalability refers to a startup's architectural and operational readiness to grow without proportionally increasing its cost structure. In the context of AI, this means designing data models, platforms, and decision systems that scale horizontally. This study

found that founders who proactively invested in modular infrastructure and data pipelines were better positioned to deploy AI across multiple functions without hitting growth bottlenecks. Startups operate in dynamic environments. The ability to adapt based on feedback, experimentation, and market shifts is critical. In AI, continuous learning encompasses organizational learning (human capital development and team upskilling) and algorithmic learning (machine learning models that improve over time). As revealed through the survey, high-performing startups embedded feedback loops, from both data and people, to evolve faster than their peers. One of the most immediate benefits of AI adoption is the automation of processes. The startups in this study that reported improved margins and faster customer acquisition timelines post-COVID frequently cited the automation of repetitive, rules-based workflows. Automation frees human resources for higher-order tasks and enables operational consistency at scale, particularly in fast-growth environments. In the AI ScaleX context, leverage refers to the ability to amplify limited resources through intelligent systems. Startups with constrained capital or headcount can use AI as a strategic lever to augment decision-making, customer service, personalization, and go-to-market execution. The study found that startups that partnered with AI platforms or built lightweight internal tools could outperform their competitors in crowded markets. Efficiency is not just about reducing cost but about optimizing every unit of input: time, capital, talent, and data. AI facilitates efficiency by streamlining workflows, reducing decision latency, and minimizing errors. Startups tracking KPIs related to AI deployment (such as CAC, LTV, or time-to-market) showed a higher

propensity to reinvest savings into innovation and scaling, creating a virtuous growth loop.

The “X” in the ScaleX model stands for exponential growth, which reflects the combined effect that comes from aligning all five of the core pillars. When a startup has the right systems to scale, when learning is part of both the culture and the technology, when automation is used in smart ways, when leverage comes through strong tech partnerships, and when operations are running efficiently, the outcome is a type of growth that does not follow a straight line. This study suggests that such exponential progress is not simply the result of having enough funding, but instead comes from being strategically ready to use AI across these connected areas. Taken together, the AI ScaleX Growth Framework and the AI ScaleX 8P Flywheel offer two ways to understand and build startup models that are not only scalable but also stable and well-suited to the age of AI. While the 8Ps help spot where a startup might be falling short or missing something important, the ScaleX model gives a clear structure based on fundamentals for those who are trying to build high-performing businesses from scratch. The aim of the ScaleX Framework is to bring together the lessons from this research and shape them into something useful for founders, investors, and others who want to use AI for steady and meaningful growth. The AI ScaleX 8P Flywheel is built around eight areas that work together to support this kind of business model. These include mindset and leadership (Psyche), a clear reason for the business to exist (Purpose), the team (People), how work is done (Process), the tech stack and infrastructure (Platform), what gets measured

(Performance), the core offering (Proposition), and the network of allies and collaborators (Partnerships).

6.4.1 Psyche: Founder Mindset and Cultural Readiness

The Psyche pillar focuses on the mindset and cultural elements that shape how startups approach AI. This study shows that the way founders and their teams think about technology, their comfort with taking risks, and their willingness to keep learning all have a strong effect on how successfully AI is used. It is not just about having the tools, but about creating a culture where data is valued, decisions are informed, and people still feel free to explore new ideas. A growth mindset helps teams try new approaches, learn from what does not work, and keep improving, rather than sticking only to what they already know. Ethics also plays a role here - using AI in ways that are fair and responsible, and setting clear expectations early on can help build trust and avoid problems later. A leadership team that stays flexible and calm in the face of change often helps the whole team adjust more easily. It is important that team members feel safe talking about AI, where they can ask questions or raise concerns without worrying about how it will be received - the ideas they share tend to be more useful and honest. Startup founders should take time to understand how their teams feel about AI, talk openly about the company's values, and provide training that helps people feel more confident in using these tools. Encouraging intellectual curiosity, clear thinking, solution-focused, and a strong sense of responsibility can go a long way in making sure AI brings benefits to everyone involved.

6.4.2 Purpose: Strategic Alignment and Vision

The Purpose pillar looks at how a startup's use of AI connects with its overall direction and business goals. This research points out that using AI just for fast results or just because it seems trendy does not usually lead to lasting success. What matters more is whether the AI is part of the bigger picture (organizational strategy) from the very beginning. When a startup has a very clear and shared understanding of how AI fits into its model and value offering, it becomes easier to make progress that truly matters. AI projects should be tied to the company's main objectives and should aim to solve real problems or create real benefits, not just follow what others are doing. It is important to think about both short-term wins and the longer journey toward stable growth. Everyone involved in the company should be part of that vision so that the purpose of using AI is well understood and supported across the board. Building this pillar means creating a strategy that explains how AI will help the business, putting together a practical plan for how projects will roll out, and staying open to changes if things do not go as expected. Talking openly about why AI is being used and how it fits into the company's mission helps keep teams focused. It also helps to set up ways to measure how AI is working so that leaders can see what is effective and where they may need to shift their approach.

6.4.3 People: Human Capital and Capabilities

The People pillar focuses on the human side of artificial intelligence and the kinds of skills and knowledge that make it work well in startup environments. This study points out that having technical skills like machine learning and data science is important, but those skills need to be matched with a strong understanding of the real business problems

AI is meant to solve. One of the major barriers to success mentioned by participants was the gap in AI knowledge across teams. Lasting progress comes when people from different backgrounds, like business, technology, or specific industries, work together and share ideas. This mix of perspectives often leads to more practical and creative outcomes. Keeping up with the pace of AI change is also important. Learning should not be limited to engineers or developers. Everyone on the team should be given chances to grow so that understanding and confidence with AI can spread across the company. Bringing together people from different walks of life helps reduce bias and leads to stronger, more inclusive solutions. Startup leaders are encouraged to take a close look at the skills they already have in their company, spot what is missing, and come up with a plan that covers hiring, training, and building key partnerships to close those gaps. Focusing on skill development is not just the right thing to do; it also leads to smarter ideas and better in-house tools that work for the entire ecosystem.

6.4.4 Process: Methodologies and Workflows

The Process pillar looks at the systems and workflows that help startups build and apply AI in a way that is both efficient and responsible. This study finds that having clear processes is essential, but these need to be flexible enough to keep up with the fast pace of change. Agile practices are especially valuable here, allowing teams to test ideas quickly, learn from what works or fails, and keep improving their solutions over time. A strong process also includes having the right structures in place to make sure data is collected and prepared properly, and that privacy and security standards are respected at every step. Good governance helps maintain accuracy and consistency, and this is

especially important when AI tools begin to influence decisions. Integrating AI with how the business already operates is a challenge. It helps to design workflows that allow AI and human teams to work together without friction. 2025 is the year of Agentic AI. Once these AI systems are in full use, teams also need to keep track of their performance and make sure the results stay aligned with the goals they were meant to support.

6.4.5 Platform: Technical Infrastructure and Data

The Platform pillar is about the kind of technology setup a startup needs so that artificial intelligence can actually work in practice. This includes things like cloud services, how and where data is stored, and the tools used to build and run AI systems. From what this research shows, if the tech foundation is weak, it becomes pretty hard for startups to do anything useful with AI. Cloud infrastructure helps a lot here, mainly because it gives access to computing power without needing to spend too much upfront. But having tech alone is not enough. What also matters is how data is handled—whether it can be gathered easily, stored properly, and used without too much trouble. It should be clean enough and reliable so that AI results are not off base. Connecting AI tools with the systems already in use can help things run more smoothly, while taking care of data security and privacy should be a priority from day one. Startups need to take a look at their current systems and think about what is missing or what needs fixing before getting deep into AI work. If they set up a good plan for dealing with data and stick to it, they are more likely to avoid problems later. Going with cloud services can also make it easier to adjust and grow when the business takes off.

6.4.6 Performance: Metrics and Measurement

The Performance pillar is about how startups figure out whether their AI efforts are actually working. This includes looking at technical results, business improvements, and also how the work lines up with goals around sustainability. The research makes it clear that being able to show some return on investment really matters. If teams cannot point to what AI is doing for them, it becomes hard to keep justifying the time and money spent. Technical numbers are a starting point, helping teams see if the systems are accurate and doing their job well. But that is only part of the picture. It is just as important to look at how AI helps the business as a whole, whether it is leading to more sales, saving money, or helping customers have a better experience. For example, AI can offer smarter product recommendations or give quicker replies to customer questions. Staff can benefit too, since AI can take care of boring, mundane, or repetitive tasks and let people focus on work that feels more meaningful. Tracking how AI helps the company grow and improve over time is a key part of this. To do all of this well, startups need a plan that brings this tracking together with their business goals. They should set targets, check results often, and update their methods as things change. Analytics Tools that track progress in real time can help catch issues early, and setting up regular feedback loops means the company keeps learning and getting better as it goes. A dashboard for tracking these key metrics is highly recommended.

6.4.7 Proposition: Value Creation and Differentiation

The Proposition pillar focuses on how startups can use AI to strengthen what they offer and stand out in a competitive market. This includes developing products and

services that are powered by AI, making the customer experience streamlined, and finding a way to deliver something that feels unique. In this competitive ecosystem, customer experience is all that counts. The research shows that the startups getting the most out of AI are the ones using it to create clear value for their customers. It is about using AI in ways that make the product or service more useful, more personalized, or more efficient. This might mean designing features that adapt to what each customer needs, or offering services that feel tailored in a way competitors cannot match. It could also mean trying out new business models that only work because of what AI makes possible. What matters most is being clear about what AI brings to the table and helping customers understand how it benefits them.

Startups should think about how AI can improve the products they already have, but also stay open to building something entirely new. Personalization is a big part of this. When customers feel that a product really understands their needs or responds to them in a smart way, it creates a stronger connection. It also helps to communicate these benefits in a simple and authentic way, taking into account how people respond and adjusting the message over time. This back-and-forth feedback cycle with the audience is important because it helps keep the offer relevant and easy to understand.

6.4.8 Partnerships: Ecosystem and Collaboration

The Partnerships pillar highlights how much startups can gain by building strong relationships outside their own teams, especially when it comes to working with AI. Startups do not succeed with AI on their own - the ones that move faster and do better often lean on the wider ecosystem around them. That could include teaming up with

third-party technology providers, data suppliers, academic groups, or industry and peer networks. Each of these relationships offers something useful. Working with AI platform providers can help startups stay up to date with tools and systems they might not be able to build themselves. Data partners can fill in important gaps, giving access to the kind of information that startups would struggle to gather alone. Academic collaborations can lead to new ways of thinking or even unlock research that pushes the company's ideas forward. Being active in startup peer groups or industry networks also matters. It gives founders the chance to learn from others, pick up on shifts in the market early, and avoid common mistakes.

It is also a good idea to bring users into the picture, like a user community, letting them play a part in shaping new products so that the result fits their needs more closely. For startups to really benefit from partnerships, they first need to be honest about where they are falling short and think about what outside help would make the biggest difference. After that, they can build a plan that looks at when it makes more sense to build in-house, buy something off the shelf, or work with someone or something else. Getting involved with incubators or innovation hubs can open up new opportunities, and joining industry groups can help keep a company informed about emerging best practices. It also helps to set clear expectations with partners and put systems in place that keep the relationship balanced and productive from the start.

6.4.9 The Flywheel Effect: Interdependence and Reinforcement

The AI ScaleX Framework is more like a flywheel than a straight line. It shows how all eight pillars work together and support each other. When we make progress in one area, it can help boost the others too, creating a nice cycle of growth and improvement. For instance, if we focus on the Psyche pillar by building a data-driven culture, it can really help with the Performance pillar by improving how the organization measures and optimizes AI projects. Plus, if we make upgrades in the Platform pillar, it can lead to better AI applications, which will strengthen the Proposition pillar as well. The flywheel idea really highlights how important it is to keep everything balanced and connected across all areas. If we focus too much on the technical stuff, like the platform and processes, but ignore the human side, like the mindset and the people involved, we might run into some serious hurdles when trying to get things running smoothly. On the flip side, having a big vision without the right skills or tools can leave one feeling like we are not really reaching our goals. Thinking about AI-driven growth as a flywheel pushes startups to look at the bigger picture when it comes to using AI. It helps them understand how all parts of their business work together in a pretty complex way.

6.5 Recommendations

Based on the findings, analysis, and the AI ScaleX Framework, this section provides specific recommendations for startup founders, investors, incubators, and policymakers seeking to leverage AI for sustainable growth.

6.5.1 Building AI-Ready Startup Infrastructure

For startups aiming to get the most out of artificial intelligence, it really starts with having the right setup for collecting, processing, and putting data to work. One of the smartest moves at the beginning is to go with a cloud-based system. It keeps things flexible and affordable, always a plus for new ventures, and makes it a lot simpler to scale up as things take off. According to our survey, 82.5% of startups are already using cloud computing, which tells us how important it's become in this space. But just using the cloud isn't enough; startups need to get serious about setting up clear, straightforward rules for data management right away. Reliable data matters a lot, and so does dealing with privacy and security concerns, something that 45.8% of AI users in our poll said is a major challenge for them. Another thing that comes up a lot is integration; a modular architecture goes a long way here, letting startups plug in different AI components as needed and helping address the integration struggles mentioned by 42.4% of AI users. In the early days, it made a lot of sense to rely on pre-built AI services and APIs rather than trying to build everything from scratch. This lets startups gradually develop custom solutions as they learn and grow, which helps with the expertise gap that 40.7% of users pointed out. Last but not least, setting up continuous monitoring and evaluation systems for AI tools is really important. These checks help spot issues early, keep performance on track, and make sure there's always room for improvement as the company and its AI grow.

6.5.2 Developing Sustainable AI Integration Strategies

Startups really need to take responsibility for how they develop and use artificial intelligence if they want to build trust and address the big ethical questions that keep coming up in research. It helps to set out clear ground rules for what's acceptable, thinking about fairness, transparency, privacy, and accountability from day one, not just as an afterthought. Ethics shouldn't be something we tack on at the end; they should be baked in right from the start and considered at every step along the way. Bringing together teams with different backgrounds, experiences, and skills is one of the best ways to spot and reduce bias, while making sure AI works for more people. Having this diversity isn't just a box to check. It actually leads to better, more inclusive technology. It's also important to keep thorough records about how each AI system is built, what it's meant to do, where the data comes from, and what its limits or potential blind spots might be. Being open about these details makes it easier for others to trust and understand the technology. Also, involving a wide range of people, like customers, employees, and even the local community, in the way AI is managed helps to make sure the systems actually reflect the values and needs of those they're meant to serve.

6.5.3 Fostering Ethical AI Practices

Startups dealing with AI often find themselves in a tricky position when it comes to staying ahead of rules that are still taking shape. It helps to pay attention early and follow big developments such as the EU AI Act or similar laws being discussed in other places, because waiting to react after everything is finalized might be too late. In our survey, close to half of the users mentioned they were uneasy about how their data was

being used, which makes privacy a serious concern. One way to deal with this is by building products in a way that keeps privacy in mind from the beginning, especially by making sure they follow things like GDPR or CCPA. Keeping records that show a company is making an effort to stay within the law can also make a big difference in how people view the business, whether that's investors, customers, or even future partners. Some young companies have started joining programs known as regulatory sandboxes, where they can try out new ideas with a bit more flexibility, and that can be a safer space to work through complex legal issues. At the same time, being part of larger conversations about how AI should be used and what rules should look like can give startups a better chance to explain their needs and have a say in shaping fair and workable standards for the future.

6.6 Directions for Future Research

While this study has provided a foundation for understanding how AI can drive scalable growth in startups, there are still plenty of areas left to explore. Future research would benefit from following startups over time, tracking how their approach to AI changes and what impact this has on performance, which could shed light on deeper causal links and long-term results. It would also be valuable to dig into industry-specific differences, as adoption patterns and what counts as "success" are likely to vary across sectors, meaning guidance could be much more tailored. Comparing startups in different regions or cultural settings could also reveal how local factors shape both the challenges and payoffs of AI adoption. In addition, rich case studies of startups that have successfully navigated the AI journey could give others a clearer view of the real

strategies and stumbling blocks that don't always show up in broader surveys. There is also an opportunity to empirically test and refine the AI ScaleX Framework introduced here, checking how well it holds up in various real-world settings. As AI continues to evolve, research should keep pace by examining the business model implications of newer technologies like generative AI, federated learning, and edge AI, especially since these might reshape the landscape yet again. Finally, there is much more to understand about how AI can be harnessed not just for growth, but also for tackling broader sustainability goals, as startups look for ways to blend economic success with positive social and environmental impact.

Research Area	Key Questions	Suggested Methodology	Potential Contributions
AI Implementation in Resource-Constrained Environments	- How do startups overcome resource limitations in AI implementation? - What strategies enable effective AI adoption with minimal resources? - How does resource scarcity influence AI technology selection?	- Comparative case studies - Longitudinal tracking of startups - Resource allocation analysis - Decision-making process mapping	- Resource optimization frameworks - Prioritization models for constrained contexts - Alternative implementation pathways - Resource leverage strategies
Founder Mindset and AI Adoption	- How do specific founder characteristics influence AI adoption decisions? - What cognitive factors facilitate or hinder AI implementation? - How does the founder's background affect AI strategy development?	- Mixed methods with psychological assessment - Decision analysis through critical incidents - Cognitive mapping techniques - Comparative founder studies	- Predictive models of founder AI readiness - Cognitive frameworks for AI decision-making - Founder development approaches - Team composition recommendations

Research Area	Key Questions	Suggested Methodology	Potential Contributions
AI-Enabled Business Model Evolution	- How do business models evolve through AI implementation stages? - What patterns of transformation emerge across different industries? - How does AI enable novel value creation mechanisms?	- Longitudinal business model tracking - Pattern recognition across industries - Value chain analysis - Customer value perception studies	- Dynamic business model frameworks - Transformation pattern taxonomies - Value creation mechanisms - Industry-specific evolution models
Sustainability Dimensions of AI in Startups	- How do startups balance the economic, environmental, and social impacts of AI? - How can AI enable more sustainable startup operations?	- Sustainability impact assessment - Multi-dimensional case studies - Trade-off analysis	- Integrated sustainability frameworks - Sustainability-enhancing AI applications
AI Ecosystem Development	- How do AI startup ecosystems evolve and mature? - What factors contribute to ecosystem productivity? - How do different ecosystem actors influence AI startup success?	- Ecosystem mapping and analysis - Comparative ecosystem studies - Network analysis - Stakeholder impact assessment	- Ecosystem development models - Success factor frameworks - Intervention design approaches - Policy recommendations
AI ScaleX Framework Validation	- How effective is the AI ScaleX Framework across different contexts? - Which pillars have the greatest impact on startup success? - How does the framework need to be adapted for different industries?	- Framework implementation studies - Comparative pillar impact analysis - Industry-specific adaptation research - Longitudinal implementation tracking	- Framework refinement - Implementation guidelines - Industry-specific adaptations - Impact measurement approaches
Post-Pandemic AI Adaptation Longevity	- Which pandemic-driven AI adaptations persist long-term?	- Longitudinal tracking studies - Comparative industry analysis	- Adaptation persistence models

Research Area	Key Questions	Suggested Methodology	Potential Contributions
	- How do adaptation patterns differ across industries and regions? - What factors determine the sustainability of crisis-driven changes?	- Adaptation persistence factors - Crisis response pattern analysis	- Crisis-driven innovation frameworks - Long-term impact assessment - Resilience-building approaches

Table 6.5: Future Research Directions. ***Source:*** *Author's Analysis, 2025.*

6.7 Concluding Remarks

This research set out to understand how early-stage startups could build business models that are not just scalable but also sustainable, making smart use of artificial intelligence in the wake of the pandemic. What stands out from the findings is that while AI has huge potential to speed up growth and open new doors for startups, there are also some tough hurdles that founders and their teams can't ignore. The AI ScaleX Framework lays out a practical way forward, showing that real, lasting progress comes from paying attention to a mix of factors: not just technology and infrastructure, but also things like founder mindset, company culture, and strong ties with partners in the wider business ecosystem. Startups that take a broad view, working through all eight parts of the framework, tend to see a positive feedback loop, growth leads to new capabilities, and those in turn drive more growth, all while keeping an eye on sustainability. As AI keeps evolving, the startups most likely to do well are those that don't just jump on the tech for its own sake, but really think about how to fit it into their values, operations, and goals. Balancing innovation with a human touch, ethical choices, and care for the wider

community means these companies are also building something that lasts and makes a positive impact. Sure, scaling with AI isn't always easy; there will be bumps along the way. But with clear intentions, thoughtful planning, and the right support, early-stage ventures can make the most of what AI has to offer and put themselves on the path to lasting success in the new normal.

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APPENDIX A

SURVEY COVER LETTER

Re: Scalable Business Models for Startups with AI: Post-COVID Growth & Resilience Survey

Dear [Name],

This survey is part of my doctoral research at SSBM Geneva and aims to discover how AI and digital transformation have impacted startup business models and scalability in the post-pandemic world. Your responses will help me understand the adoption of AI and technology, which will contribute to creating a framework that helps founders build resilient and scalable business models that leverage AI.

Estimated Time to Complete: **5-10 minutes**
All responses are **confidential.**

All survey participants will be invited to an exclusive **90-minute live session** where I share research insights and strategies for implementing an AI-leveraged business model (June 2025).

Thank you,

Radhakrishnan KG

Doctoral Research Candidate,

Swiss School of Business Management Geneva (Switzerland).

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APPENDIX B

INFORMED CONSENT

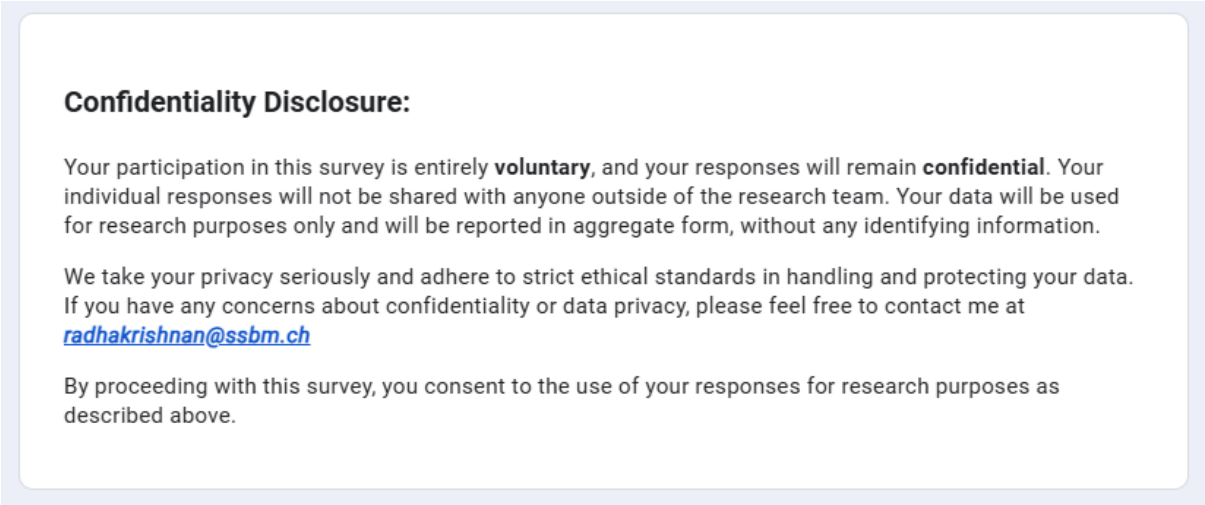


Figure 3.7.2 Informed Consent and Confidentiality Disclosure from the survey form.

APPENDIX C: SURVEY QUESTIONS AND SIGNIFICANCE FOR EACH

Section 1: Personal and Company Information

Questions 1 through 7:

What is the name of your Company? *

If you are associated with multiple companies, please specify the name of the company you wish to include in this research study

Your answer

What is your Full Name? *

Your answer

What is your role within the company? *

- ◯ CEO/President
- ◯ CTO (Chief Technology Officer)
- ◯ COO (Chief Operating Officer)
- ◯ CFO (Chief Financial Officer)
- ◯ CMO (Chief Marketing Officer)
- ◯ Founder without C-level title
- ◯ Other Executive (e.g, VP, Director)
- ◯ Other:

Industry *

- ◯ IT / ITES
- ◯ MarTech
- ◯ EduTech
- ◯ E-commerce
- ◯ FinTech
- ◯ HealthCare
- ◯ Other: _____

In which year was your company founded? *

- ◯ Before 2015
- ◯ 2015 - 2020
- ◯ 2021 - Present

How many employees does your company currently have? *

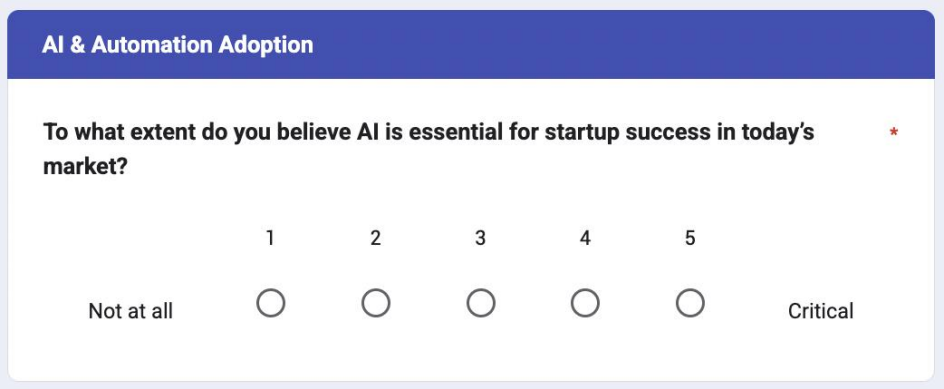
- ◯ 1-10
- ◯ 11-50
- ◯ 51-200
- ◯ 201+

Please provide a short description of your company's core products/services **in one sentence.** *

Your answer

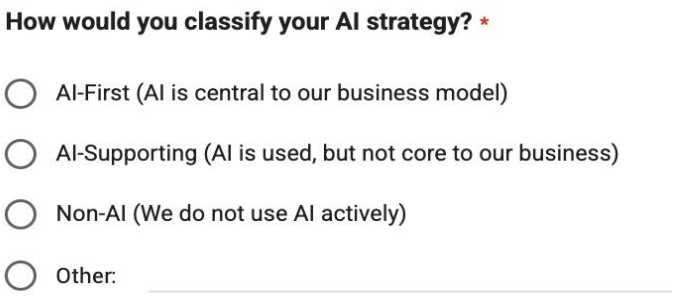
Section - AI & Automation Adoption

Question 8



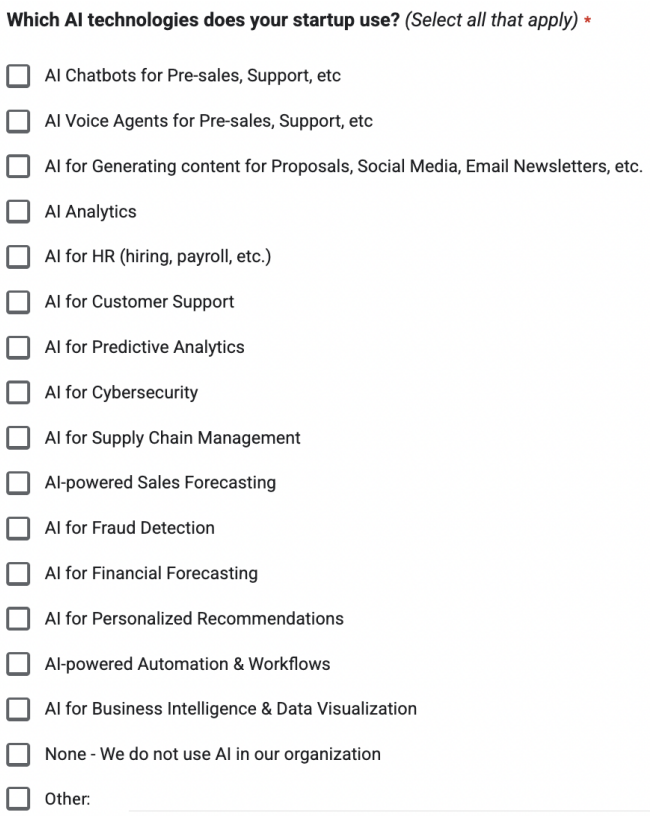
Founders who see AI as vital for success focus their resources and strategies on AI-driven business models, which aligns with the main theme of this thesis. In the post-pandemic era, AI is crucial for creating scalable and adaptable digital business models. We can examine how respondents' opinions on AI relate to their organization's AI adoption, changes in business models, and reported growth or resilience. This can show whether startups that see AI as essential are truly investing in it and if this affects their business results, such as profitability, market growth, or efficiency.

Question 9



The survey asks respondents to describe their approach to artificial intelligence by choosing whether they see it as a core part of their operations, a helpful supporting tool, or not very relevant to their strategy. It gives insight into how AI influences the design of business models, the ability to innovate, and how a company sets itself apart from the competition. Startups that describe themselves as "AI-first" are likely to have reworked their main value proposition, the way they deal with customers, or even their daily workflows to put AI at the center. On the other hand, those that use AI more as a support may rely on it in certain areas like marketing, data analysis, or customer service, but have not changed the core of how their business runs. This kind of classification becomes more useful when it is compared with other business indicators like how fast the company is growing, whether profits are improving, how quickly they are reaching new markets, and how they are working to keep or attract customers.

Question 10



This survey question plays a key role in understanding how AI is actually being used in early-stage startups. Rather than relying on general impressions or expectations, it gathers specific information about the tools and systems that have already been put into practice. This makes the analysis more grounded in the realities faced by founders, offering a clearer view of how AI fits into day-to-day operations. Understanding which AI technologies are in use allows for a more accurate picture of each startup's level of maturity and highlights where AI is creating genuine business value. These insights directly support the broader findings in the literature, which describe AI as both a driver of growth and a key factor in supporting innovation. In this context, survey questions Q9 and Q10 are especially relevant, as they relate closely to the "Purpose" and "Proposition"

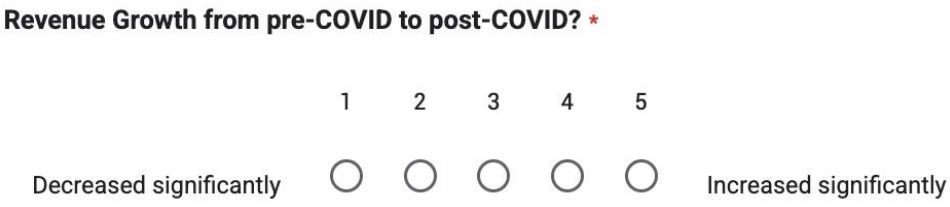
pillars of the AI ScaleX Framework. These questions explore how well AI fits with the strategic direction and value system of the startup, helping to assess not just whether AI is present, but whether it is being used in a way that supports long-term goals.

Question 11

This question looks at the difficulties that early-stage startups face when trying to bring AI fully into their business. It ties directly into one of the core themes of this study, which is how AI can support growth that is both scalable and sustainable. Understanding why some startups manage to make AI work while others fall short helps uncover the real barriers that exist within the startup landscape. This research takes a closer look at those challenges by considering where startups are in terms of readiness and what structural or internal factors might be holding them back. One of the key points from the study is that

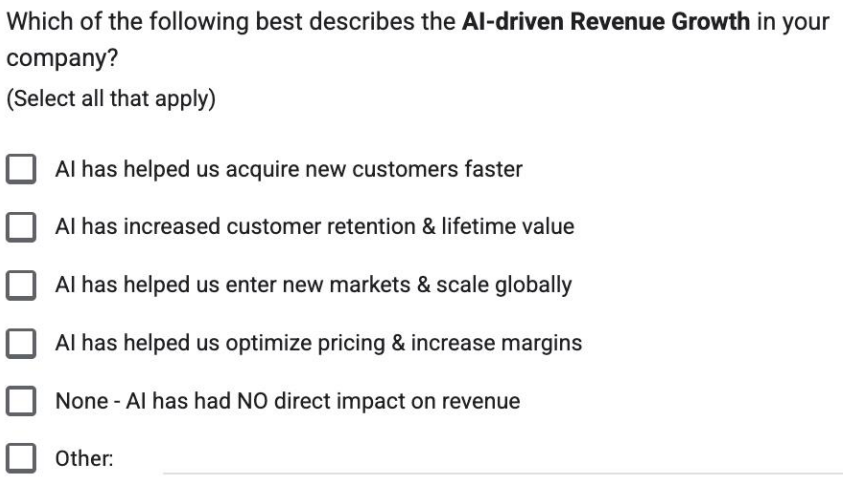
being ready for AI does not come down to belief or interest alone. It has a lot to do with the resources available inside the company and the broader systems around it. This gives weight to the argument that support structures and targeted guidance matter, and it sets the stage for offering policy recommendations that could make it easier for startups to adopt AI in ways that actually work for them.

Question 12



This survey question is key for understanding how early-stage startups have adapted, scaled, or dealt with challenges from the COVID-19 pandemic, particularly in terms of business model resilience and AI integration. Revenue growth is one of the most objective and quantifiable indicators of a business model's performance. Startups should assess their revenue changes before and after the pandemic to understand its economic impact and evaluate the effectiveness of their strategies, including AI adoption.

Question 13



This question explores the financial and business growth effects of AI adoption, which are essential to my thesis on how early-stage startups have leveraged AI to establish scalable and resilient business models post-pandemic. Instead of just asking about AI usage, it explores how AI directly helps generate revenue. Practical insights into its effects on various Stages of business growth, such as customer acquisition, retention, market expansion, and margin optimization. This makes it a critical question for understanding the strategic value of AI adoption beyond superficial implementation. The question helps me identify startups that view AI as a tech upgrade versus those that connect it directly to business growth. Existing literature shows that AI is transformative, but this question aims to find out if it actually improves financial performance in real-world startups.

Question 14

Which AI technologies have directly contributed to **INCREASED REVENUE for your company?** *(Select all that apply)*

- [ ] AI-powered Lead Generation
- [ ] AI-driven Marketing (Ad Optimization, Personalization)
- [ ] AI-powered Sales Forecasting
- [ ] AI-driven Customer Segmentation
- [ ] AI-based Pricing Optimization
- [ ] AI-powered E-commerce Recommendations
- [ ] AI-powered Fraud Detection & Risk Management
- [ ] AI-driven Financial Forecasting
- [ ] None
- [ ] Other: _____

This question focuses on the specific AI tools or applications that founders believe have directly contributed to revenue growth. This makes the responses much more useful, as they reveal which technologies are actually delivering business value rather than just being used for experimentation or routine support. By letting respondents

point to the AI solutions that made a real impact, the data helps identify which tools are working best across different industries, company sizes, and business models. This also makes it possible to spot patterns, for example, whether startups using AI for lead generation or customer segmentation tend to grow revenue faster than those using it mainly for internal functions like HR or compliance. Looking at these trends also helps evaluate how deeply AI is being used and how that connects to bigger goals like scaling after the pandemic or entering new markets.

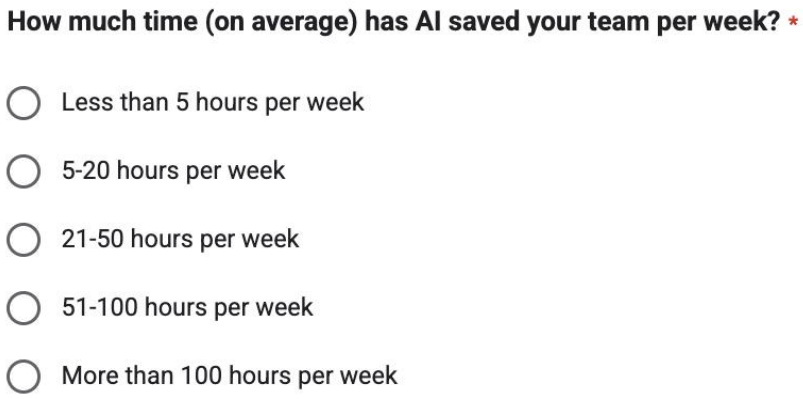
Question 15

Which AI technologies have **helped your team SAVE TIME and improve efficiency?** *(Select all that apply)*

- ☐ AI Chatbots for Customer Support
- ☐ AI-powered Workflow Automation
- ☐ AI-driven HR & Recruiting Automation
- ☐ AI-powered Document & Contract Analysis
- ☐ AI-driven Task Management & Scheduling
- ☐ AI-powered Code Generation & Software Development
- ☐ AI-powered Data Analysis & Reporting
- ☐ AI-powered Legal & Compliance Automation
- ☐ None - AI did not help our team save time
- ☐ Other: _____

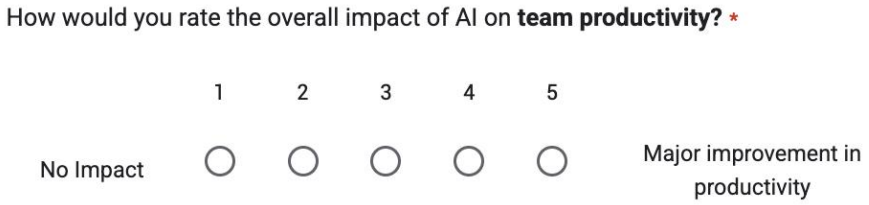
Operational efficiency and process optimization are crucial elements in constructing scalable business models, especially for resource-constrained early-stage startups. The research examines how AI increases revenue, improves operational strength, and optimizes processes, which are essential for a startup's sustainable growth in the post-pandemic era. This question identifies whether startups use AI to improve internal efficiency instead of just for sales or marketing growth.

Question 16



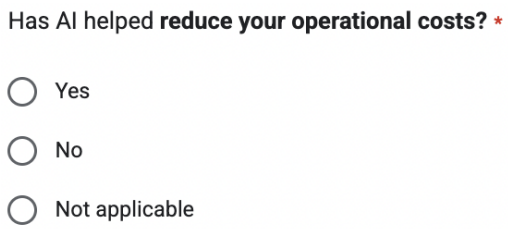
This survey question measures one of the clearest and most practical outcomes of using AI - saving time and improving efficiency. For early-stage startups, where resources are tight and teams are often stretched, tools like automation, predictive systems, or analytics can take a real load off. In the context of this research, the question offers a direct way to see how much of the operational burden AI is helping to carry. This is not just about convenience. Time savings often lead to better use of resources, reduced costs, and more space for teams to focus on growth activities. When AI is used well, it can speed things up without adding pressure, which helps startups grow in a way that is more stable and manageable. Looking at how much AI contributes to day-to-day operations also helps show its broader role in shaping outcomes across the startup ecosystem.

Question 17



This survey question plays a central role in the thesis, as it looks at how adopting AI can help early-stage startups scale and stay resilient, especially in the wake of the pandemic. By focusing on team productivity, the question connects AI directly to how well a startup operates day to day. This is important because improvements in performance often reflect a company's real potential to grow in a steady and sustainable way. It also encourages respondents to think about AI as more than just a set of technical tools. Instead, it positions AI as something that can raise the overall quality of work, make teams more efficient, and improve how people work together. These are all factors that strongly influence whether a startup can keep moving forward and stay competitive as it grows.

Question 18



Operational efficiency is crucial for sustainable growth in early-stage startups, particularly in the uncertain post-pandemic landscape. AI can reduce human error, automate routine tasks, and improve decision-making, leading to lower operating costs. This survey question allows the research to validate whether such theoretical expectations are being realized in real startup environments. This thesis explores the influence of AI adoption on enhancing business resilience. It examines whether startups save costs using

AI, which helps evaluate the economic advantages of AI-driven business models. The question centers on one of the most tangible and measurable dimensions of performance: cost management.

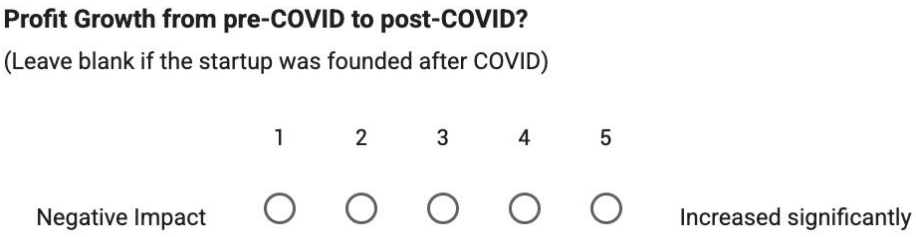
Section 3 - Post-COVID Business Status & AI Growth Trends

Comparing the pre-pandemic and post-pandemic periods shows how startups adapted and showed resilience during the crisis. This comparative approach effectively examines the factors behind sustainable and scalable business models, aligning with the study's objectives.

Question 19

This survey question directly examines a key indicator of a startup's growth trajectory, which is market expansion, in the specific context of the post-COVID business landscape. The thesis focuses on how startups are building scalable and resilient business models, and the ability to expand into new markets after a global disruption is one of the strongest practical validations of business model strength, adaptability, and innovation. By assessing whether startups were able to increase their geographic or customer reach during this period, the question provides valuable data to evaluate whether factors like AI adoption, business model innovation, and operational agility are linked to actual growth outcomes.

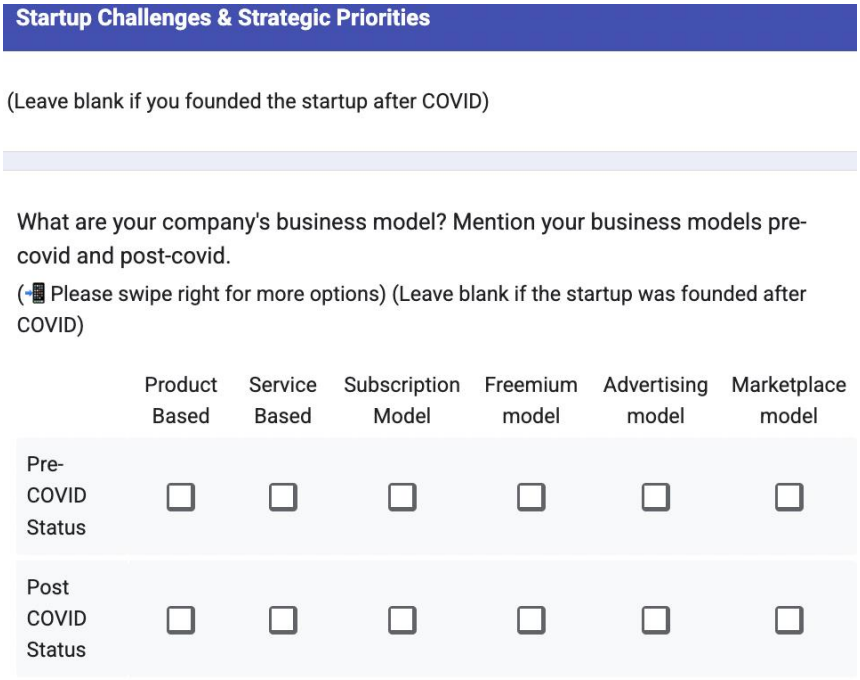
Question 20



The survey question on profitability plays an important role in evaluating how well a startup's business model is working, especially in the face of disruption and uncertainty. It supports the core argument of this thesis, which looks at how startups can build models that are both scalable and resilient. Profit growth is a strong indicator—not just of higher revenue, but also of smart decisions, efficient operations, and good control over costs. By asking respondents to reflect on their profit performance before and after the pandemic, the question goes beyond theory and captures the actual impact of changes like digital upgrades or adopting AI. Profitability also gives a clearer picture of financial health than revenue alone, since revenue can rise for many reasons, such as marketing pushes or entering new markets, without reflecting real gains. This research uses the responses to explore how closely AI adoption is tied to stronger financial outcomes. It also helps examine whether startups that rethought their business models during the pandemic have seen better profit growth, and highlights the difference between growing fast and growing in a way that lasts.

Section 4 - Startup Challenges & Strategic Priorities

Question 21



Asking founders to describe their business models before and after the pandemic offers a useful way to see how startups have changed the way they create value, reach customers, and generate revenue. These shifts are at the heart of business model theory, and tracking them helps this research explore how startups are responding to real-world challenges. The question also makes it possible to look at how closely AI adoption ties in with changes in strategy or direction. It shows whether founders are adapting to the market or continuing with the same approach, even as conditions shift. By comparing how business models evolved, the study can better understand how startups are using digital tools like AI to strengthen their operations and build more flexible, scalable paths

to growth. It also helps reveal which startups are using this period of change to rethink their models in ways that could support long-term resilience.

Question 22

What do you consider to be your company's primary competitive advantage? (📲 Please swipe right for more options) (Leave blank if the startup was founded after COVID)

	Quality of product/service	Customer Experience	Technological innovation	Brand reputation	Pricing
Pre-COVID	◯	◯	◯	◯	◯
Post-COVID	◯	◯	◯	◯	◯

The question about competitive advantage gives a closer look at how startups see themselves gaining an edge in the market. It helps reveal whether they view AI as a main driver of what makes them different, or if they are still relying on more familiar strengths. In the context of this research, it is useful for understanding how business models are shifting after the pandemic and what role technology plays in those changes. When startups talk about what sets them apart, it shows how they are thinking about growth and how they plan to hold their position as things continue to change. This also opens up a chance to see whether those who focus more on innovation and AI tend to grow faster or reach new markets more easily. Looking at these patterns alongside other data points, like how their models evolved or what kind of results they are seeing, helps build a more complete picture of what is working in the current landscape.

Question 23

Where is your company primarily focusing its innovation efforts?
(📲 Please swipe right for more options) (Leave blank if the startup was founded after COVID)

	Product innovation	Service innovation	Process innovation	Business model innovation	Technological innovation	Infrastructure innovation
Pre-COVID	☐	☐	☐	☐	☐	☐
Post-COVID	☐	☐	☐	☐	☐	☐

The question differentiates between pre-COVID and post-COVID innovation priorities, allowing the study to identify patterns in strategic changes and which aspects of innovation are now more important in AI-driven startups. Comparing shifts in innovation across areas like product, process, business model, and infrastructure provides insights into how startups use their limited resources to build resilience and grow sustainably. After COVID, a greater focus on technological and business model innovation may show a reaction to digital disruption. Shifting to process or service

innovation aims to improve operational efficiency and enhance customer experience through AI tools. These shifts are particularly important in the context of early-stage ventures, which often operate with constrained capital but high adaptability.

Question 24

Which of the following best describes your company's culture?
(📲 Please swipe right for more options) (Leave blank if the startup was founded after COVID)

	Innovation-driven	Customer-centric	Agile/Adaptive	Data-driven	Employee-focused	Social responsibility/Impact oriented
Pre-COVID	○	○	○	○	○	○
Post-COVID	○	○	○	○	○	○

Organizational culture is a critical factor in determining how startups respond to disruption, embrace innovation, and execute scalable strategies. The thesis explores how early-stage startups use AI and digital transformation to create resilient and sustainable

business models after the pandemic. The company's culture plays a pivotal role in the pandemic. An innovation-driven or data-driven culture is more open to AI adoption and experimentation, while a rigid or traditional culture tends to resist change, despite technological advancements. The research examines how the self-reported culture of startups changed before and after the pandemic, highlighting the links between these cultural shifts, technology use, growth, and strategic changes. This question is important because it shows the mindset and behavior of the organization, which can indicate a startup's readiness to adopt advanced technologies like AI and adapt to scalable business models in changing environments.

Question 25

How do you make decisions at your organization?

(📲 Please swipe right for more options) (Leave blank if the startup was founded after COVID)

	Data-driven (decisions heavily influenced by data analytics)	Market-Driven (decisions influenced by market trends)	Agile Decision Making (Decisions made quickly and iteratively in response to changing circumstances.)
Pre-COVID	◯	◯	◯
Post-COVID	◯	◯	◯

The way startups make decisions plays a big role in how well they deal with uncertainty, encourage innovation, and grow, especially in the kind of unpredictable environment that followed the pandemic. This thesis looks closely at how AI and digital tools support startup growth and resilience, with a focus on the choices founders make to bring those changes into the business. A startup's decision-making style, whether it is based on data, market feedback, or an agile, fast-moving approach, gives insight into how ready it is to adopt new technologies and adjust when things get tough. This survey question helps assess whether those decisions reflect the kind of adaptability and long-term thinking that support sustainable growth. In young companies, how decisions are made often shapes how quickly they respond to change, whether they lean on instinct or hard data, and how closely they stay in tune with what the market needs. Decision-making, in this sense, is both a sign of strategic maturity and a tool that can drive real progress.

Question 26

How would you describe the decision-making process in your company? (📲 Please swipe right for more options) (Leave blank if the startup was founded after COVID)

	Centralized (decisions made by top management)	Decentralized (decisions made by individual teams/departments)	Democratic (decisions made collectively)
Pre-COVID	◯	◯	◯
Post-COVID	◯	◯	◯

An organization's decision-making structure affects its ability to adapt, innovate, and grow, especially in the changing post-pandemic startup environment. The way decisions are made - centralized in leadership, spread across teams, or through group discussions- affects a startup's ability to adapt, embrace new technologies, and refine strategies. The research will analyze decision-making approaches before and after the COVID-19 pandemic to determine if companies changed their structures to be more resilient and adaptable to the crisis. This question is important because it highlights a key organizational trait that affects various factors, including AI adoption, market growth, and operational efficiency. Centralized startups may adopt AI and innovations more

slowly but with greater control. In contrast, decentralized structures allow teams to experiment and implement AI tools, fostering bottom-up innovation essential for scalability and resilience. Democratic decision-making promotes inclusive thinking and collaboration, fostering cultural agility and greater acceptance of digital transformation.

Question 27

What are your company's strategic priorities?
(Select up to three, Please swipe right for more options) (Leave blank if the startup was founded after COVID)

	Scaling business operations	Diversifying product/service offerings	Expanding into new markets	Increasing profitability	Building brand recognition	Raising capital/investment	Talent acquisition and development	Research and development	Customer acquisition and retention
Pre-COVID	☐	☐	☐	☐	☐	☐	☐	☐	☐
Post-COVID	☐	☐	☐	☐	☐	☐	☐	☐	☐

Understanding the strategic priorities that guide startup decisions is key to seeing how they build models that can grow and hold up over time, especially in the post-pandemic world. By looking at what goals startups focused on before and after COVID-19, this research can trace how their thinking changed in response to outside pressures and new technologies, including the use of artificial intelligence. This question helps uncover whether startups shifted from just trying to survive toward growth, or if they placed more focus on innovation as a way forward. These shifts connect directly with the themes in this thesis around adaptation and resilience. Strategic priorities shape how teams use their time, where leadership puts its focus, and how resources are spread out

across the business. In turn, these choices affect both how well a startup performs in the short run and how likely it is to grow in a stable way over the long term.

Question 28

Which of the following best describes your company's operational model? *

	Entirely in-office	Hybrid (mix of in-office and remote)	Entirely remote
Pre-COVID	○	○	○
Post-COVID	○	○	○

This question looks at how startups adjusted their operations to survive, adapt, and grow during the COVID-19 pandemic. Shifting from traditional office setups to hybrid or remote models is more than just a logistical change; it reflects a deeper transformation in how work gets done, how teams collaborate, and how technology supports daily operations. These changes tie closely to digital transformation and the broader theme of resilience explored in this thesis. By examining these shifts, the research can see whether startups that moved toward remote or hybrid setups were also more likely to adopt AI, digital tools, or agile ways of working. This matters because those elements often support scalability and help companies stay flexible under pressure. Operational models also shape how startups use technology to collaborate, how they manage growth without major increases in fixed costs, and how quickly they can respond when things change. This question helps assess whether tech-driven startups were quicker

to adjust, whether flexible models relate to stronger revenue or profit growth, and how all of this connects to resilience, a central idea throughout the study.

Question 29

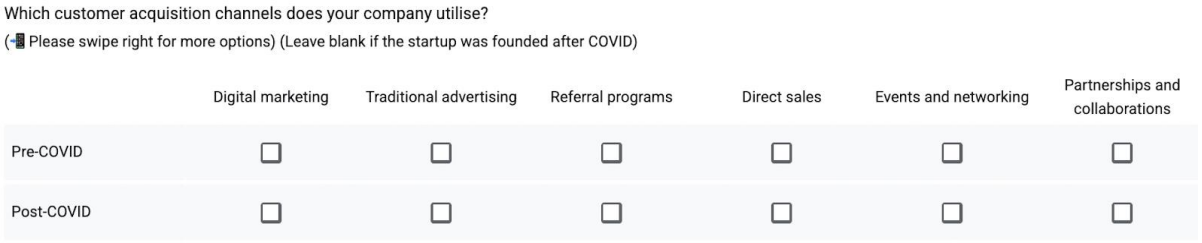
Answer the following questions by rating each aspect carefully.
(📲 Please swipe right for more options) (Leave blank if the startup was founded after COVID)

	Decreased slightly	Decreased significantly	Remained the same	Increased slightly	Increased Significantly
How has the size of your workforce changed from pre-COVID to post-COVID?	○	○	○	○	○
Did your company expand its product/service offerings in response to COVID-19?	○	○	○	○	○
How has your market reach and presence change from pre-COVID to post-COVID?	○	○	○	○	○

This question invites startups to reflect on several key areas of their performance and strategic direction, bringing together a broad view of how they are doing after the disruptions of the pandemic. Within the scope of this thesis, which looks at AI adoption, business model shifts, and resilience, it works as a structured self-assessment. It captures both how startups see themselves and what they have actually experienced across core parts of the business. The areas rated in this question include growth, customer acquisition, operational flexibility, profitability, innovation, market reach, and how ready the company is to use technology. Using a scale to rate these areas helps create data that can be compared across all respondents, making it easier to see wider patterns and differences between startups. It also allows for a clearer look at whether startups that rate themselves highly in areas like innovation or digital readiness are the ones showing stronger results in revenue, market expansion, or successful AI use. Over time, the

answers can help show if those who managed to adapt after the pandemic are also the ones scoring well across strategic, operational, and tech-related factors.

Question 30


Which customer acquisition channels does your company utilise?
(📲 Please swipe right for more options) (Leave blank if the startup was founded after COVID)

	Digital marketing	Traditional advertising	Referral programs	Direct sales	Events and networking	Partnerships and collaborations
Pre-COVID	☐	☐	☐	☐	☐	☐
Post-COVID	☐	☐	☐	☐	☐	☐

The question explores the customer acquisition strategies employed by startups, which is a critical aspect of achieving scalability, particularly in the post-pandemic, digital-first business landscape. Given the thesis's focus on how startups evolve their business models, adopt AI, and adapt their strategies to drive sustainable growth, the customer acquisition channels used by startups serve as a direct reflection of their market strategy and technological maturity. Startups that have shifted towards AI-powered marketing tools or digital-first customer acquisition channels post-COVID are likely to demonstrate higher scalability, agility, and resilience, aligning with the central themes of the research. This question sheds light on the market-facing side of the startup business model, investigating how startups attract, convert, and retain customers. It allows us to understand if startups have shifted their focus from traditional acquisition channels to digital channels in response to COVID-19 disruptions, assess the relationship between digital transformation and customer acquisition success, and explore whether startups that

diversified or digitalized their customer acquisition channels post-COVID also reported higher growth, profitability, or market expansion.

Question 31

Which of the following has been your biggest challenge post-COVID? *(Pick upto three)* *

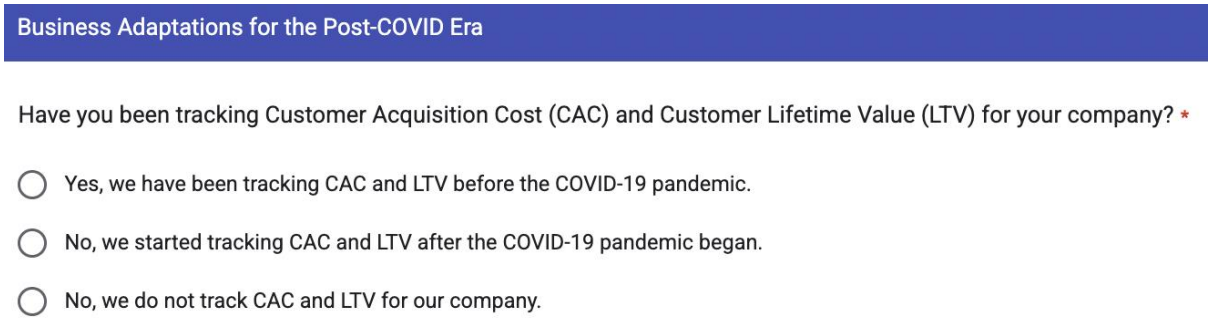
- [ ] Market uncertainty
- [ ] Talent acquisition
- [ ] Funding access
- [ ] Digital transformation
- [ ] Competition
- [ ] Supply chain disruption
- [ ] Shifting customer demands
- [ ] Remote work transition
- [ ] Cybersecurity threats
- [ ] Regulatory Compliances (Data Privacy, IP, Labor, Financial Reporting, HIPAA, etc)
- [ ] Other:

This question is critical for understanding the key contextual factors that shaped startup strategy and performance in the post-pandemic business landscape, which is a key focus of the thesis research on the role of AI and business model evolution in enabling scalable and resilient startups. Examining the specific challenges faced by startups since the onset of COVID-19 allowed them to gain insights into how these pressures influenced their strategic decision-making processes. This includes whether companies adopted new technologies like AI to address these challenges, whether their business model

adaptations were reactive or proactive in nature, and whether particular barriers correlate with important performance metrics such as revenue, profitability, and market expansion. This question helps to uncover the root causes of the strategic shifts that occurred during and after a period of significant uncertainty.

Section 5 - Business Adaptations for the Post-COVID Era

Question 32



Customer Acquisition Cost and Customer Lifetime Value are two critical financial and strategic metrics for evaluating the sustainability and scalability of a startup's business model. Tracking CAC and LTV indicates whether startups are using data-driven performance metrics to understand growth efficiency and long-term customer profitability. Startups that monitor these metrics are more likely to make informed decisions about scaling, market expansion, and resource allocation, especially when leveraging AI for customer segmentation, marketing optimization, and personalized engagement, which are key themes in this research. Actively tracking CAC and LTV demonstrates a startup's strategic financial literacy and operational maturity, focusing on customer acquisition efficiency, ROI, and long-term customer relationships rather than

short-term transactions. This is particularly significant in the post-pandemic economy, where customer retention and acquisition costs have become more volatile due to shifting market behaviors and digital competition. This question allows me to assess whether growth or resilient startups are also applying structured, data-backed growth strategies, analyze if metric-tracking companies are more likely to adopt AI tools, and identify whether metric-tracking startups show stronger profit growth and scalability compared to those that do not track key customer metrics.

Question 33

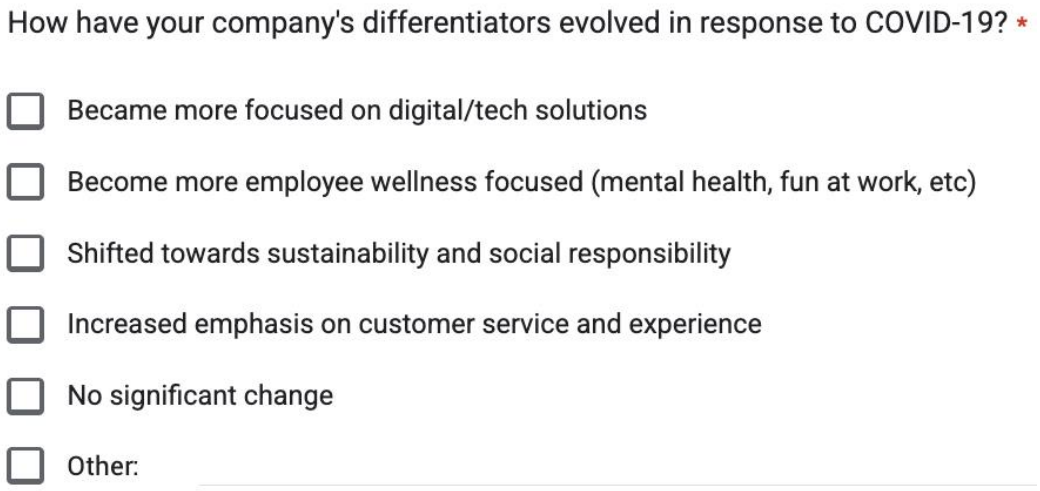
What types of technology has your company adopted or developed?
(Select all that apply, 📲 Please swipe right for more options) (Leave blank if the startup was founded after COVID)

	Cloud computing	Artificial Intelligence (AI) / Machine Learning (ML)	Internet of Things (IoT)	E-commerce platforms	Cybersecurity solutions	Remote collaboration tools	Blockchain	Marketing Automation (Digital Marketing)
Pre-COVID	☐	☐	☐	☐	☐	☐	☐	☐
Post-COVID	☐	☐	☐	☐	☐	☐	☐	☐

The adoption of technology, particularly in the context of digital transformation, is central to a startup's ability to build resilient and scalable business models in the post-pandemic era. This question provides a direct measure of whether startups have invested in the technological capabilities required to adapt and thrive, especially in light of market disruptions and shifting customer behaviors since COVID-19. The question reveals the breadth and depth of a startup's digital transformation journey, moving beyond just AI adoption to offer a fuller view of a company's technological maturity across multiple fronts, such as cloud-based infrastructure, AI and machine learning integration, process

automation, cybersecurity, and customer engagement platforms. This question allows me to understand whether startups with wider technology adoption portfolios are also reporting stronger growth, market expansion, and operational efficiency. It also enables a comparison of whether those that prioritize certain technologies are better positioned for long-term scalability and resilience, and it helps contextualize the role of AI as part of a broader digital ecosystem rather than an isolated solution.

Question 34



This question examines how startups adapted their core competitive strengths to the rapidly changing market conditions created by COVID. It focuses on the strategic transformation of how companies reevaluated their USD and positioning under pressure. This question captures that shift and allows the research to analyze it systematically. Differentiators are what enable startups to stand out and stay relevant in competitive markets. When those differentiators evolve in response to external shocks like the

pandemic, it signifies strategic learning, organizational flexibility, and market awareness, all traits that align closely with scalable, resilient business models. This question enables the us to understand the direction of post-COVID business model evolution, examine the relationship between differentiation strategy and other key variables like AI adoption, operational models, market expansion, and revenue growth, and validate theoretical models from the literature review that argue digital transformation and customer-centricity are becoming defining traits of modern, scalable businesses.

Question 35

Has the primary focus area of your strategic efforts shifted due to COVID-19? *

- ◯ Yes, towards digital transformation
- ◯ Yes, towards market expansion
- ◯ Yes, towards product/service innovation
- ◯ No significant shift

This question looks into how startups shifted their priorities during the pandemic, especially when everything was changing so fast. It connects back to the bigger theme of this thesis, which is about how companies build models that can grow and still hold up when things get uncertain. By seeing where startups chose to focus, we get a better idea of how flexible they were and how quickly they were able to respond. Some of them may

have adapted and found ways to keep growing, while others might have taken a more cautious route. What makes this question useful is that it also shows if those shifts were tied to using AI or bringing in new digital tools. It helps tell whether companies were just reacting to what was happening or if they tried to take control and plan ahead. These changes in focus often happen before the bigger business model changes, so it can also give a sense of whether they moved toward tech, just tried to stay afloat, or aimed to expand. Looking at these responses alongside results like profit, revenue, or customer growth helps build a clearer picture of what actually worked in the end.

Question 36

How have your customer acquisition strategies evolved from pre-COVID to post-COVID?
(Leave blank if the startup was founded after COVID)

- ◯ More focused on digital channels
- ◯ Reduced focus on digital channels
- ◯ Diversified into new offline channels
- ◯ No significant change
- ◯ Other: _____

Customer acquisition is a core driver of startup growth and scalability. After the pandemic, many startups were compelled to rethink their approaches to reaching and engaging new customers amid a landscape reshaped by lockdowns, remote-first work, and shifting consumer behaviors. This research question directly examines whether startup customer acquisition strategies, which are the primary engines for growth, were adapted in response to these conditions, and whether those adaptations were driven by technology, new channels, or structural shifts in the market. This query enables the research to explore several key aspects: whether startups that transitioned to AI-driven targeting, digital marketing automation, or content-led growth strategies demonstrated greater resilience and scalability in the post-pandemic era, how the evolution of acquisition strategies correlates with reported revenue growth, market expansion, and cost optimization, and whether digital transformation in the customer acquisition domain is a defining characteristic of high-growth startups in the post-COVID landscape. Notably, if the data reveals that many startups reported shifts toward AI-powered marketing and personalization, it would provide strong evidence to support the argument that AI is a central enabler of scalability and resilience.

Question 37

Have there been any significant changes to your company's Unique Selling Proposition (USP) since the onset of the COVID-19 pandemic?

- ◯ Yes, there have been major changes.
- ◯ No, there have been no significant changes.
- ◯ I'm not sure / I don't know.

The unique selling proposition of a startup defines its market positioning and differentiation from competitors, which is closely linked to the resilience, scalability, and evolution of its business model. Examining whether startups revised their USP in response to the COVID-19 pandemic allows me to assess whether external pressures, such as shifts in consumer expectations, digital disruption, or operational constraints, triggered a strategic redefinition of their value propositions. A change in a startup's USP often signals a broader transformation in its business model, making this line of inquiry essential for tracing strategic adaptation. This research question can capture whether startups recalibrated their competitive identity due to the pandemic's market disruptions. Changes in a company's USP frequently reflect a fundamental recognition of new customer needs, competitive dynamics, or operational realities. The question enables us to examine whether startups that adopted AI or digital-first strategies also shifted their USP toward tech-driven or customer-centric value propositions explore whether changes in USP are associated with higher revenue growth, profit growth, or market expansion in the post-pandemic era, and assess whether companies that maintained a static USP positioning struggled more with adaptation compared to those that redefined their proposition for the post-COVID market.

Section 6 - Looking Forward & Future Research

Inquiring about market trends, future prospects, and insights enriches the **qualitative** aspect of the analysis and helps identify key themes through thematic analysis.

Question 38

What are the top 3 strategic priorities for your company post-COVID? *(Select up to three)* *

(Select all that apply)

- [ ] Scaling business operations
- [ ] Expanding into new markets
- [ ] Increasing profitability
- [ ] Research & development
- [ ] Customer acquisition & retention
- [ ] Talent acquisition & workforce development
- [ ] Other:

This research question explores the strategic priorities that startups adopted in response to the COVID-19 disruption. Investigating strategic priorities provides insights into the leadership mindset and organizational approach to navigating the post-pandemic

environment. It examines whether startups intentionally pursued strategies focused on AI-driven transformation, customer expansion, operational efficiency, or product innovation as part of their recovery and growth efforts. The question highlights how startups balance considerations of survival, growth, and innovation in the post-pandemic landscape.

Question 39

This research question explores how startups' strategic foresight and market awareness are vital for their business model resilience and scalability in today's fast-paced, post-pandemic, and tech-driven landscape. Market trends that startup leaders expect to impact their industry help us understand their decisions on AI adoption,

operational changes, customer strategies, and digital transformation. The question addresses how startups view the competitive landscape and their long-term strategy, which is vital for evaluating their readiness for future disruptions and growth. It unveils the external factors that influence startup strategy, extending beyond just immediate operational issues. Startups that anticipate major trends like AI, digital transformation, personalization, and sustainability are more likely to evolve their business models proactively instead of just reacting under pressure.

Question 40

Based on your experiences, what are the **Key Success Factors** for building a scalable and sustainable startup in a post-COVID world? *

Your answer

This research question examines the lessons and strategies that startup leaders learned from dealing with the challenges of COVID-19. It is a key part of the thesis on scalable and resilient business models in the post-pandemic world. Identifying the key success factors that founders and decision-makers prioritize provides insight into how

businesses prepare for growth, adapt for resilience, and utilize AI and digital transformation to generate long-term value. This question also complements the empirical analysis in the study by adding a layer of practical, experience-based knowledge to support or challenge the theoretical framework. It captures the collective wisdom of the startup ecosystem on what drives scalability and resilience in uncertain environments. This allows us to: identify the recurring themes in startup success, such as AI adoption, agility, customer focus, and digital transformation, which directly align with the research objectives; compare these self-reported success factors against measurable outcomes to validate which factors are most influential in practice; and test whether startups that highlight technology-driven factors as key success elements are also those that have adopted these tools extensively. This offers valuable input for building practical recommendations for future startups and ecosystem stakeholders based on lived experiences, reinforcing the applicability of the research findings beyond academic theory.

Question 41

What is the **single biggest decision you made** that drove highest growth at your organization? *

Your answer

This research question aims to capture the real-world strategic decisions that directly contributed to startup growth, which is central to the thesis theme. While much of the thesis explores the adoption of AI, digital transformation, and business model resilience from a structural perspective, this question delves into the core of executive decision-making. It invites respondents to reflect on the specific, high-impact actions that shaped their growth journey, allowing the study to link theoretical frameworks of business model evolution and strategic agility to lived entrepreneurial experience. This question surfaces qualitative insights that enrich and deepen the quantitative findings. Startups often face pivotal moments where key decisions, such as adopting AI, expanding into new markets, reallocating resources, shifting to digital platforms, or redesigning product offerings, fundamentally change their growth trajectory. The question allows us to identify common patterns in high-impact decisions across startups, especially those involving technology adoption, AI integration, market expansion, customer strategy, or business model innovation; cross-reference qualitative insights with survey metrics like revenue growth, profit growth, market expansion, and AI strategy classification to strengthen the real-world credibility of the conclusions; and understand the human, strategic, and often context-dependent side of scalability, something pure metrics alone cannot reveal.

Question 42

How do you envision the next phase of growth for your business? What are the top strategic moves you plan to make to drive future success and if possible, become recession-proof? *

Your answer

This research question offers vital insights into the forward-looking strategies, growth planning, and resilience-building approaches of startups. Understanding how founders and leadership teams envision their future and the strategic actions they intend to take provides crucial context for evaluating the role of technology, market positioning, innovation, and operational agility as deliberate levers for fostering growth and mitigating risk. The question directly aligns with the study's exploration of startups' preparedness for future disruptions, including economic downturns and market volatility. It surfaces real-world strategic thinking and anticipation of future challenges, rather than merely reporting on past decisions or current performance. This question allows us to: 1) Understand whether startups plan to prioritize AI-driven automation, market diversification, cost efficiency, customer retention, or product innovation in their next growth phase; 2) Identify how startups balance the dual challenge of short-term survival and long-term resilience by observing which strategic moves they associate with recession-proofing and scalability; and 3) Compare planned strategies to the current state

of the business to assess the alignment between vision, readiness, and action. Addressing this question enhances the strategic depth of the research and strengthens conclusions about which mindsets and models are associated with resilience in uncertain times.

APPENDIX D - MEMO FROM CEO OF DUOLINGO

Duolingo's CEO AI approach Email

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🦩 Below is an all-hands email from our CEO, Luis von Ahn – we are going to be AI-first.

Just like how betting on mobile in 2012 made all the difference, we're making a similar call now. This time the platform shift is AI.

What doesn't change: We will remain a company that cares deeply about its employees.

I've said this in Q&As and many meetings, but I want to make it official: **Duolingo is going to be AI-first**.

AI is already changing how work gets done. It's not a question of if or when. It's happening now. When there's a shift this big, the worst thing you can do is wait. In 2012, we bet on mobile. While others were focused on mobile companion apps for websites, we decided to build mobile-first because we saw it was the future. That decision helped us win the 2013 iPhone App of the Year and unlocked the organic word-of-mouth growth that followed.

Betting on mobile made all the difference. We're making a similar call now, and this time the platform shift is AI.

AI isn't just a productivity boost. It helps us get closer to our mission. To teach well, we need to create a massive amount of content, and doing that manually doesn't scale. One of the best decisions we made recently was replacing a slow, manual content creation process with one powered by AI. Without AI, it would take us decades to scale our content to more learners. We owe it to our learners to get them this content ASAP.

AI also helps us build features like Video Call that were impossible to build before. **For the first time ever, teaching as well as the best human tutors is within our reach.**

Being AI-first means we will need to rethink much of how we work. **Making minor tweaks to systems designed for humans won't get us there.** In many cases, we'll need to start from scratch. We're not going to rebuild everything overnight, and some things—like getting AI to understand our codebase—will take time. However, we can't wait until the technology is 100% perfect. We'd rather move with urgency and take occasional small hits on quality than move slowly and miss the moment.

We'll be rolling out a few constructive constraints to help guide this shift:

- We'll gradually stop using contractors to do work that AI can handle
- AI use will be part of what we look for in hiring
- AI use will be part of what we evaluate in performance reviews
- Headcount will only be given if a team cannot automate more of their work
- Most functions will have specific initiatives to fundamentally change how they work

All of this said, **Duolingo will remain a company that cares deeply about its employees**. This isn't about replacing Duos with AI. It's about removing bottlenecks so we can do more with the outstanding Duos we already have. We want you to focus on creative work and real problems, not repetitive tasks. **We're going to support you with more training, mentorship, and tooling for AI in your function.**

Change can be scary, but I'm confident this will be a great step for Duolingo. It will help us better deliver on our mission — and for Duos, it means staying ahead of the curve in using this technology to get things done.

--Luis

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