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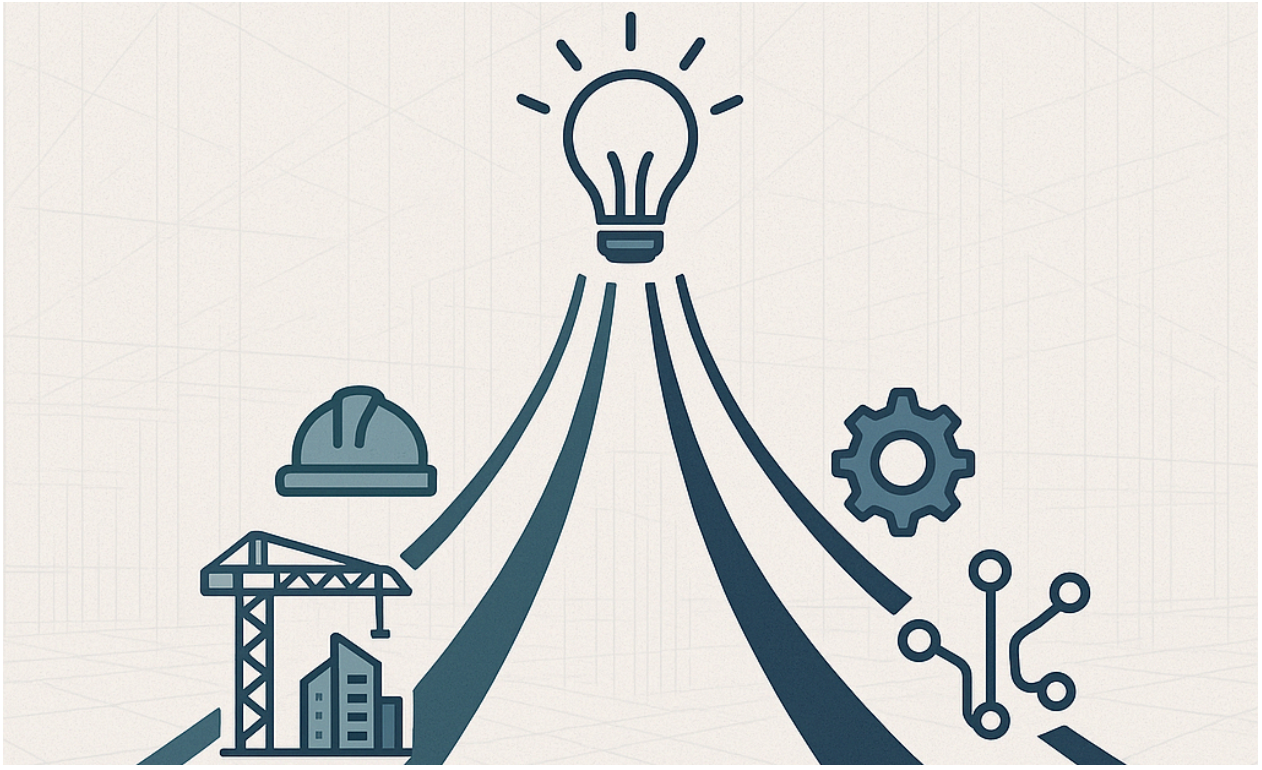

Developing a Dual-Track Startup Framework for Construction Technology Ventures

Integrating Business Formation and Product Development – A Blueprint for Civil Engineer Entrepreneurs

Master's thesis in

Mohamad Omar Alzokani

Department of Architecture and Civil Engineering
Design and Construction Project Management, MSc Progr 2025

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Examensarbete ACEX30
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Cover:
Cover illustration generated with ChatGPT, visualizing the dual-track startup framework tailored for the ConTech sector, further explained in Chapter 7.

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ABSTRACT

The construction industry is undergoing a slow but necessary transformation driven by the need to address inefficiencies, budget overruns, regulatory complexities, and technological stagnation. While innovation in construction technology (ConTech) has the potential to resolve many of these challenges, most existing startup methodologies are not adequately equipped to support founders operating in this highly regulated, fragmented, and slow-to-adopt sector. This thesis investigates how civil engineers, typically non-technical founders in the startup sense, can navigate the entrepreneurial landscape and build viable startups that respond to construction-specific demands.

Through a mixed-methods approach combining qualitative interviews with six industry experts and in-depth analysis of two ConTech startup case studies and a literature review, this research evaluates the strengths and limitations of three dominant startup frameworks: the Lean Startup, The Startup Owner's Manual, and Disciplined Entrepreneurship. Findings reveal that while each methodology offers valuable components, they often assume digital-first models, linear progression, and technical co-founders, assumptions that conflict with the real-world constraints of ConTech ventures.

In response, this study introduces the Refined ConTech Startup Blueprint, a dual-track framework that integrates product/service development with business formation and operations. To validate the blueprint, it was implemented in a real-world context through the launch of a new startup, Permitt.ai, built from idea to execution using the proposed methodology. This practical application demonstrates the blueprint's effectiveness in addressing key challenges such as regulatory compliance, team formation, product-market fit, and early-stage traction.

By offering a structured yet adaptable roadmap grounded in empirical insight and field testing, the thesis contributes to the growing body of knowledge in entrepreneurship within engineering disciplines and provides practical guidance for civil engineers seeking to launch startups that catalyze meaningful change in the construction industry.

Keywords: Construction Technology, Startup Methodologies, Civil Engineers, Innovation, Lean Startup, ConTech, Disciplined Entrepreneurship, Business Formation, Permitt.ai, Startup Blueprint

Utveckling av ett tvåspårigt ramverk för startups inom byggteknik

Integrering av affärsbildning och produktutveckling – En modell för civilingenjörer som entreprenörer

Examensarbete inom masterprogrammet Design and Construction Project Management

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SAMMANFATTNING

Byggindustrin genomgår en långsam men nödvändig omvandling, driven av behovet att hantera ineffektivitet, budgetöverskridanden, regulatoriska komplexiteter och teknologisk stagnation. Även om innovation inom byggteknik (ConTech) har potential att lösa många av dessa utmaningar, är de flesta befintliga startup-metodiker inte tillräckligt anpassade för att stödja grundare som verkar inom denna hårt reglerade, fragmenterade och hårdvarubaserade sektor. Denna avhandling undersöker hur civilingenjörer – som ofta inte är tekniska grundare i traditionell startup-mening – kan navigera det entreprenöriella landskapet och bygga livskraftiga startups som svarar på branschspecifika behov.

Genom en metodansats som kombinerar kvalitativa intervjuer med sex branschexperter och djupgående analys av två ConTech-startups, utvärderar denna studie styrkor och begränsningar hos tre etablerade startup-ramverk: Lean Startup, The Startup Owner's Manual och Disciplined Entrepreneurship. Resultaten visar att även om varje metodik erbjuder värdefulla komponenter, bygger de ofta på antaganden om digitala produkter, linjära utvecklingsprocesser och tekniska medgrundare – antaganden som inte stämmer överens med verklighetens utmaningar för startups inom byggsektorn.

Som svar på detta introducerar studien det förfinade ConTech Startup Blueprint – ett dubbelspårigt ramverk som integrerar produkt- och tjänsteutveckling med affärsetablering och operationell struktur. För att validera modellen har den tillämpats i ett verkligt sammanhang genom lanseringen av en ny startup – Permitt.ai – som byggdes från idé till genomförande enligt det föreslagna ramverket. Denna praktiska tillämpning visar modellens effektivitet i att hantera nyckelutmaningar som regulatorisk efterlevnad, teamuppbyggnad, produktmarknadsanpassning och tidig tillväxt.

Genom att erbjuda en strukturerad men flexibel väg framåt, baserad på empirisk insikt och praktisk testning, bidrar denna avhandling till den växande kunskapsbasen inom entreprenörskap för ingenjörsyrken och ger konkret vägledning för civilingenjörer som vill starta företag som driver verklig förändring inom byggbranschen.

Nyckelord: Byggteknik, Startup-metodik, Civilingenjörer, Innovation, Lean Startup, ConTech, Disciplined Entrepreneurship, Affärsetablering, Permitt.ai, Startup-ramverk

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A heartfelt thank you to my wife, Nawar, for her unwavering encouragement and patience, and to my son, Amr, whose presence reminds me every day of the importance of purpose and perseverance.

List of figures and charts

List of Tables

Glossary of Terms and Technical Phrases

ConTech (Construction Technology): A shorthand for **construction technology**, referring to innovative hardware, software, and platform solutions designed to improve the construction industry's processes. It encompasses everything from construction management software to on-site robotics. In this thesis, *ConTech* represents the sector in which these startups operate.

Lean Startup: An entrepreneurial methodology introduced by Eric Ries that advocates **iterative product development, rapid prototyping, and validated learning**. The *Lean Startup* focuses on quickly building a *Minimum Viable Product* and using customer feedback to guide continuous improvement, rather than following a rigid, upfront business plan.

The Startup Owner's Manual: A comprehensive guide and methodology for startups by Steve Blank and Bob Dorf. It outlines the **Customer Development Model** and provides step-by-step processes for finding a sustainable business model. In the thesis, *The Startup Owner's Manual* is analyzed as one of the existing frameworks, noting its strengths and limitations for ConTech ventures.

Disciplined Entrepreneurship: A **24-step startup framework** developed by Bill Aulet (MIT). *Disciplined Entrepreneurship* breaks down the process of building a startup into detailed steps (from market segmentation to product launch) and is known for its structured approach. The thesis evaluates how well this framework addresses (or overlooks) the needs of ConTech startups.

BIM (Building Information Modeling): A digital process for **creating and managing building project data** during its life cycle. *BIM* involves generating 3D models that include geometry and critical project data (materials, schedule, costs, etc.). In context, 5D-BIM (mentioned in the thesis) extends this by integrating cost and schedule dimensions. BIM is cited in the thesis as an example of advanced technology that the construction industry has been slow to fully adopt.

MVP (Minimum Viable Product): The most basic version of a product that still delivers core value to customers. An *MVP* has just enough features to allow real-world testing and feedback. The thesis discusses MVPs in relation to startup methodologies, highlighting how ConTech startups may need physical prototypes or pilot projects as their MVPs (which can be more challenging than software MVPs).

Business Model Canvas (BMC): A strategic management template (introduced by Alexander Osterwalder) used for developing new or documenting existing business models. It presents a company's value proposition, customers, finances, and infrastructure in a one-page diagram. In the thesis, the *Business Model Canvas* is used as a tool (e.g., in the Permitt.ai case) to map out assumptions and hypotheses in the new ConTech startup blueprint.

Pivot: A **structured course correction** for a startup, involving a change in strategy without a change in vision. Startups *pivot* when an aspect of the business isn't working – for example, targeting a new customer segment or tweaking the product based on feedback. The concept is discussed in the thesis as a critical part of the Lean Startup cycle and broader startup evolution, especially when initial assumptions fail.

Permitt.ai: The **case-study startup** implemented by the author to validate the refined ConTech Startup Blueprint. *Permitt.ai* is a pseudonym/alias for a new venture (focused on streamlining construction permits via AI, as implied by its name). In the thesis, Permitt.ai serves as a practical example, demonstrating how the proposed dual-track methodology can be applied from idea through execution.

1. Introduction

1.1 Background

The construction industry, particularly in Sweden, is one of the largest contributors to the national economy, yet it continues to struggle with long-standing challenges. These include persistent inefficiencies, project delays, budget overruns (Horne, 2024; The Access Group, 2025), and a historically slow adoption of emerging technologies. Despite the rapid advancement of digital tools and industrialized methods in other sectors, construction has often been perceived as traditional, fragmented, and resistant to innovation (FIEC, 2023). However, recent reports indicate an accelerating uptake of digital solutions to address these very issues (Deltek, 2024; Gleeds, 2024).

This evolving landscape, driven by both persistent challenges, urgent sustainability demands (United Nations Environment Programme [UNEP], 2024), and emerging technological capabilities, presents a significant opportunity: the sector is ripe for disruption and transformation (Horne, 2024; McKinsey & Company, 2024a). Civil engineers, who possess deep domain knowledge of complex workflows and technical insight into integrated project delivery (Gleeds, 2024; SignOnSite, 2024), are uniquely positioned to drive this transformation, not merely as practitioners but as entrepreneurs. However, the transition from engineer to startup founder is neither simple nor well-supported by current frameworks (Duval-Couetil, 2012). Many existing startup methodologies are heavily skewed toward digital-first ventures and technical founders, often failing to account for the realities of hardware-based innovation, regulatory compliance, or long sales cycles typical of ConTech.

1.2 Purpose of the Thesis

The purpose of this thesis is to explore how civil engineers can effectively enter and navigate the startup landscape in the construction technology (ConTech) sector. It examines how traditional startup methodologies align, or fail to align, with the realities of construction innovation and proposes a refined framework tailored to the unique challenges of this field.

By studying real-world ConTech startups and engaging with industry experts, this thesis aims to bridge the gap between generalized startup advice and the practical steps needed for launching viable, scalable businesses in construction. The end goal is to provide a structured and adaptable blueprint that helps non-technical founders, particularly engineers, build investor-ready and impact-driven companies within the ConTech ecosystem.

1.3 Research Questions

Primary Research Question:

- How can civil engineers develop, structure, and launch startups that effectively address inefficiencies, regulatory barriers, and innovation gaps in the construction industry?

Secondary Research Questions:

1. How well do established startup methodologies (Lean Startup, Startup Owner's Manual, Disciplined Entrepreneurship) apply to ConTech ventures, and where do they fall short?

2. What are the critical steps and parallel processes required to build both the business foundation and the product/service in hardware-driven and compliance-heavy environments?
3. What practical strategies can non-technical founders use to form teams, attract investment, and enter fragmented construction markets successfully?

2. Problem Formulation

2.1 Defining the Problem

According to Bridgit (2023), the construction industry is frequently challenged by issues such as cost overruns, project delays, and a slow pace of technological adoption. These challenges hinder productivity and innovation across the sector. Table 1 below outlines eight of the most prevalent problems currently facing the industry.

Table 1: *8 Top challenges and issues in the construction industry (Bridgit, 2023)*

Challenge Name	**Problem**
Cost Overrun	Exceeds budget due to poor estimates, design changes, and payment delays.
Delays	Projects often face delays from uncontrollable factors and management issues.
Inadequate Communication	Communication gaps lead to unrealistic expectations and missed tasks.
Labor Shortage	Skill gaps and a declining workforce challenge the industry.
Poor Planning, Forecasting, and Budgeting	Goals unmet due to improper planning, forecasting, and budget issues.
Lacking Organization and Haphazard Document Management	Manual documentation prone to errors.
Problems with Cash Flow	Payment delays disrupt the ability to pay for labor and materials.
Slow Adaptation to Emerging Technologies	Hesitance towards new tech adoption limits efficiency improvements.

2.1.1 Cost Overrun

One of the most common issues in the construction industry is cost overrun, which occurs when the final project cost exceeds the budget that was established in the early stages. This problem has been widely studied and is known to affect decision-making in project selection, especially when cost estimations are underestimated. Incorrect estimations can lead to the selection of inappropriate projects, as decision-makers are not given accurate projections across all projects (Lind & Brunes, 2015).

Cost overruns are not always straightforward to identify or prevent due to various forms of bias in project management. For instance, project managers may fall prey to availability bias, where they believe cost overruns are more frequent than they actually are simply because these incidents are easier to remember compared to projects that remained on budget. This cognitive bias can cloud

judgment, leading managers to assume a causal relationship where none exists (Kahneman, 2011). Additionally, confirmation bias can further exacerbate the problem, as managers may ignore evidence that contradicts their belief in a cost overrun (Lind & Brunes, 2015).

Unclear definitions of cost overruns and inconsistent ways of estimating project costs also contribute to the issue. When the terms and methods used for estimation aren't consistent, it becomes difficult to compare different projects or figure out why costs are going over budget (Lind & Brunes, 2015). This makes it challenging to fully understand the reasons behind cost overruns and their impact on construction projects.

In addition, cost estimates are often presented as specific figures without factoring in uncertainty or risk analysis. This lack of risk consideration means that there is little room for adjusting estimates based on potential cost fluctuations (Lind & Brunes, 2015), making it even more likely that costs will exceed the original budget.

Moreover, while the construction industry has access to advanced technologies like 5D-BIM (Building Information Modeling) that could help manage costs more effectively, the slow adoption of these tools further contributes to cost overruns. 5D-BIM integrates cost estimation with scheduling and material management, allowing for more dynamic and real-time cost tracking. However, the industry has been resistant to fully embracing such innovations, limiting the ability to prevent cost overruns through improved project management and cost accuracy (Hussain et al., 2023).

Despite the potential of technologies like 5D-BIM to improve cost planning and tracking, the slow adoption of these innovations remains a significant barrier, leaving many projects exposed to cost overruns that could have been avoided with better tools and processes (Hussain et al., 2023).

2.1.2 Delays

Project delays are a pervasive issue in the construction industry, often resulting in significant financial losses, disputes, and even project abandonment. Delays occur for a variety of reasons, from poor project management and inadequate planning to unforeseen external factors. According to Álvarez-Pozo et al. (2024), delays are particularly prevalent in the construction phase of projects, and these, alongside issues in the preliminary phases and project management, account for over 60% of project delays.

Key contributing factors include poor planning, lack of coordination among stakeholders, and inefficient procurement processes. For example, delays in material supply or labor shortages can severely impact the timeline of a project. Additionally, communication breakdowns between contractors, suppliers, and clients exacerbate these issues, leading to further delays (Álvarez-Pozo et al., 2024).

Despite these challenges, there are mitigation measures that can be employed to reduce delays. These include improving project planning and coordination, ensuring timely procurement, and maintaining efficient communication between all stakeholders involved. Implementing better project management practices can help streamline the construction process and minimize the risk of

delays. In the specific case of turnkey projects, the use of modern project management methodologies has been shown to reduce both delays and cost overruns, significantly improving the profitability and sustainability of such projects (Álvarez-Pozo et al., 2024).

Moreover, advancements in technology, particularly the integration of Artificial Intelligence (AI) in project management, offer promising solutions to mitigate these delays. According to Kubar and Skol (2024), AI has the potential to significantly streamline project management processes by automating routine tasks, enhancing decision-making, and providing predictive insights that allow for better planning and risk management. AI applications, such as machine learning algorithms, can analyze historical project data to predict potential delays and identify solutions in advance, enabling project managers to take proactive measures. Despite these advancements, the slow adoption of AI within the construction sector remains a challenge, with many companies hesitant to fully integrate these technologies due to the initial cost and the learning curve required for effective implementation.

2.1.3 Inadequate communication

Communication plays a critical role in the success of construction projects, yet it remains one of the most frequently cited problems within the industry. Poor communication among stakeholders can lead to delays, cost overruns, and quality issues, and the construction industry in Sweden is no exception. According to an article by Svensk Byggtjänst (2014), communication failures and poor leadership are responsible for significant inefficiencies in construction projects, contributing to construction faults and financial waste.

As noted in the article, Monica Lööw, an expert with over 20 years of project management experience, highlights that communication is one of the key factors holding the construction industry back. Lööw explains that many project managers are overwhelmed by their responsibilities, being expected to manage everything from time and cost control to stakeholder integration and communication. This overload often results in comments like, "I don’t have time to communicate," which ultimately leads to costly mistakes (Svensk Byggtjänst, 2014). Lööw estimates that poor communication alone makes construction projects about 13% more expensive than necessary, adding approximately 40 billion SEK annually to Sweden’s construction costs.

A study conducted by Alba Research, commissioned by Briab, supports these findings, revealing that the conditions for project managers are often unsustainable. Builders and project managers frequently have unspoken expectations of one another, while excessive administrative duties limit the time available for effective communication and leadership. This lack of communication not only leads to delays and higher costs but also prevents project managers from fully leveraging their strengths (Svensk Byggtjänst, 2014).

Despite these challenges, advancements in communication technologies offer potential solutions to mitigate these issues. One such technology is 4D Augmented Reality (AR), which allows for enhanced communication and collaboration on construction projects. According to Golparvar-Fard et al. (2009), 4D-AR enables project managers, architects, and other stakeholders to virtually walk through the construction site using as-built scene models and geo-registered images. This

technology allows project participants to remotely access and discuss construction progress in real-time, without being physically present on-site. By minimizing travel time and providing real-time visual updates, 4D-AR can greatly improve the efficiency of communication and decision-making, potentially addressing one of the core issues that contribute to delays and mismanagement in construction projects (Golparvar-Fard et al., 2009).

2.1.4 Labor shortage

Labor shortages have become a growing issue in the construction industry, and the situation has only worsened since the COVID-19 pandemic. According to a report by the European Construction Industry Federation (FIEC), labor shortages are now nearly three times higher than they were a decade ago (FIEC, 2023). This shortage is driven by a combination of factors, including an aging workforce, the difficulty in attracting young people to the industry, and an increasing demand for construction workers to meet the requirements of large-scale projects, such as those driven by the EU Green Deal and national recovery plans.

The construction industry in Europe, which accounts for 10.1% of the EU's GDP and 6.4% of total employment, is seeing a mismatch between the demand for skilled labor and the available workforce. This labor gap threatens the industry's ability to meet the rising demand for construction projects, especially in the context of the green and digital transitions (FIEC, 2023). The FIEC report highlights that between 2022 and 2027, 25% of the workforce will need to be upskilled or reskilled to meet the industry's evolving needs. This labor shortage is not only a problem of numbers but also a skills gap, as the industry shifts toward more sustainable and digitally advanced practices.

Furthermore, demographic factors such as the aging workforce are exacerbating the problem. In Sweden, for instance, 10% of the construction workforce is expected to retire by 2028, further straining the sector's capacity to meet growing demand (FIEC, 2023). This situation reflects a broader, acute global challenge, with recent 2024 analyses indicating a significant shortfall of skilled construction labor in other major economies, such as the United States requiring an estimated 500,000 additional workers (Deltek, 2024; McKinsey & Company, 2024a). The industry’s long-standing image problem, which has made it less attractive to younger workers and women, is also contributing to the challenge of filling vacant positions.

2.1.5 Poor planning, forecasting, and budgeting

One of the most significant challenges in the construction industry is poor planning, forecasting, and budgeting. These deficiencies can lead to project delays, cost overruns, and, in some cases, the total failure of a project. According to Linarc (2022), misaligned project expectations due to inadequate budgeting and planning is a recurring issue in the construction sector. When a construction budget is not planned carefully, it leaves little room for the unexpected, such as price fluctuations in materials or delays in labor availability.

Poor forecasting can also disrupt timelines. Without a reliable forecast for material costs, labor, and other essential resources, projects are at risk of running over budget, which often leads to financial strain. Additionally, inaccurate forecasting results in delays because it impacts procurement and the timely delivery of resources to the construction site. In turn, this creates a domino effect, causing

inefficiencies and slowing down the overall project. The lack of effective budgeting and forecasting strategies hinders the capacity to adapt to unforeseen changes, further increasing the risks associated with cost management and scheduling.

Moreover, many companies still rely on outdated systems that make budgeting and forecasting difficult, often exacerbating inefficiencies. A lack of integrated project management tools means that teams are left to manually track costs, which leads to inaccurate estimates and a poor understanding of financial projections (Linarc, 2022). As a result, the construction industry frequently struggles with maintaining accurate financial controls, which are crucial for successful project delivery.

2.1.6 Lacking organisation and haphazard document management

Effective document management is critical in construction projects, as it helps ensure that all stakeholders have access to up-to-date information. However, the industry often suffers from disorganized and haphazard document management systems, which can lead to miscommunication, delays, and errors. According to Linarc (2022), many construction projects still rely on outdated methods of document storage, such as paper-based systems or scattered digital files, making it difficult to keep track of project documents like contracts, blueprints, permits, and invoices. This challenge is increasingly being addressed not just by standalone software but by integrated digital solutions like Building Information Modeling (BIM) and cloud-based platforms, which are gaining traction to improve data management, real-time collaboration, and overall project transparency (Claris DesignBuild, 2024; SignOnSite, 2024).

Disorganized document management not only slows down the decision-making process but also increases the risk of lost or misplaced information, which can lead to costly mistakes. In complex construction projects, where multiple parties are involved, the lack of a centralized document management system means that important updates and revisions can be missed, causing confusion among stakeholders and further delaying project timelines.

Moreover, inadequate document management makes it difficult to maintain accountability. Without clear records of changes and updates, teams may struggle to identify the root causes of delays or miscommunication, further compounding the problems on-site (Linarc, 2022). This lack of organization can be particularly detrimental in the long run, as it affects the entire lifecycle of the project, from initial planning to final delivery.

Moreover, modern technologies are proving to be effective in resolving issues related to poor document management. For instance, document management software allows construction managers to store and manage essential project documents, such as contracts, specifications, and drawings, in one centralized location. This helps ensure that all stakeholders have access to the most up-to-date information and track changes over time. Such technologies improve efficiency, reduce errors, and enable better communication and collaboration across teams, enhancing overall project management (Hjh Commercial Consultants, 2023), the broader trend, underscored by significant investment in 'Enhanced Productivity' solutions (CEMEX Ventures, 2025), is towards comprehensive ConTech platforms that embed these functionalities within larger project management ecosystems, thereby enhancing overall efficiency and data integrity (Gleeds, 2024).

2.1.7 Problems with cash flow

Cash flow management (i.e., the process of tracking and optimizing the net amount of cash and cash-equivalents moving into and out of a business) is a major issue in the construction industry, where even slight mismanagement can have severe consequences. According to Panda (2022), poor cash flow can lead to a range of problems, from delayed payments to complete insolvency. In construction, cash flow involves not ju st the movement of money in and out of a business but also the timing of expenses throughout the project's life cycle. Misaligned cash flows can cause significant delays, disrupt the procurement of materials, and hinder the timely payment of workers and subcontractors, resulting in delayed or halted projects.

The entire construction value chain, contractors, subcontractors, and suppliers, is affected by cash flow issues. Delayed payments and long payment terms can create a ripple effect throughout the project, impacting everyone involved. This leads to strained relationships between stakeholders, increased project costs, and a higher risk of project failure (Panda, 2022). As noted by Panda (2022), 84% of construction companies report facing cash flow problems, making it one of the most pressing financial issues in the industry.

While cash flow management is a significant challenge in the construction industry, technology is increasingly providing solutions. Project management software and financial tracking tools are helping construction companies better manage their cash flows by automating cost monitoring, tracking expenses in real time, and ensuring that payments are made on time. These tools can enhance overall financial visibility, helping businesses anticipate and manage potential cash flow disruptions before they impact project timelines (Hjh Commercial Consultants, 2023).

2.1.8 Slow adaptation to emerging technologies

The construction industry has long struggled with the slow adoption of new technologies, despite the clear advantages they bring. According to Hart (2022), many construction companies still rely on outdated methods like spreadsheets and paper-based systems, with only minor improvements in digital adoption. A significant barrier is the lack of research and development (R&D) budgets, with nearly 60% of companies having no dedicated funds for technological advancements. Furthermore, 38% of firms report a lack of staff to support new technology implementation. This resistance is further exacerbated by an aging workforce, unfamiliarity with digital tools, and a reluctance to embrace disruptive changes in construction techniques.

Despite the industry's potential to improve productivity by 30-45% through technology adoption (nSpek, 2023), the industry faces additional hurdles, such as project uniqueness, fragmentation, and high costs for initial investment (Hart, 2022). The lack of common standards for data sharing further complicates the digitalization process, leaving many companies behind in realizing the benefits of technologies like AI, drones, and BIM (nSpek, 2023). For the construction industry to remain competitive and address its inefficiencies, embracing digital transformation is no longer optional.

Moreover, integrating technology into daily operations has already begun to transform how construction projects are managed and executed. Tools such as Building Information Modeling (BIM), drones, and project management software have improved accuracy and efficiency, while

reducing rework and enhancing safety (Lumberfi, 2023). For example, drones and IoT devices enable real-time data collection, while AI can predict compliance issues, providing a clearer and safer path toward project completion. The adoption of such technologies can significantly reduce risks, enhance collaboration, and increase productivity, making technology a vital component in addressing the long-standing challenges within the construction industry (Lumberfi, 2023).

2.2 Importance of the Problem

2.2.1 Analysing the problem

In analyzing the problem formulation from the previous section, it becomes evident that the core challenges facing the construction industry, such as cost overruns, delays, and slow adaptation to emerging technologies, stem from structural issues within the industry. The slow pace of technological adoption, in particular, presents a major barrier to innovation. While established construction firms may face internal hurdles in rapidly developing and deploying novel technologies due to operational inertia or resource allocation priorities, startups often possess the agility and focused expertise to address specific industry gaps (ZACUA Ventures, 2025). Consequently, startups offer a promising solution, as they can develop ready-to-use, cost-effective technologies that larger firms might be slower to create due to factors such as limited R&D budgets or different strategic priorities (CEMEX Ventures, 2025).

The table below summarizes the identified problems and their potential solutions, emphasizing the role of startups in addressing these gaps:

Table 2: *Summary of the identified problems and their potential solutions.*

Challenge	**Problem**	**Solution (Tech Solution & Startup Example)**
Cost Overrun	Exceeds budget due to poor estimates, design changes, payment delays	AI-Powered Cost Forecasting such as Converge
Delays	Management issues and unforeseen factors	AI Schedule Optimization such as Alice
Inadequate Communication	Gaps in communication between stakeholders	Unified Communication Platform such as Kraaft
Labor Shortage	Skill gaps and declining workforce	On-site Robotic Automation such TyBOT & IronBOT
Poor Planning and Budgeting	Misaligned expectations and inaccurate forecasts	AI-Driven Budgeting Tools such as Constream
Lacking Organization/Document Mgmt.	Disorganized document management leading to errors	AI Document Intelligence such as Document Crunch
Cash Flow Issues	Payment delays affecting procurement and progress	Use of specialized financial tracking software and automated payment systems such as GCPAY

Slow Tech Adoption	Resistance to new tech due to costs, complexity, and lack of standards	Development and dissemination of affordable, user-friendly, and integrated technological solutions such as PROCORE

2.2.2 Challenges Faced by Construction Tech Startups

Startups in the construction industry often face unique challenges that make it difficult to scale and gain widespread adoption. According to Fuller (2024), one of the primary issues is the industry's fragmentation and project-based nature, which requires startups to "cross the chasm" twice, first by proving their technology internally within a company and then by scaling across multiple companies and projects. Startups often encounter a "death by pilot" trap, where successful pilots don't necessarily translate into broader adoption across the company due to the short-term nature of construction projects and the reluctance of companies to invest in widespread implementation without strong referrals and proven success on multiple projects.

Additionally, the complexity of the construction sector and the number of stakeholders involved in every project often leads to long, staggered sales cycles, which can be challenging for startups with limited resources. Startups are also required to adapt their technologies to fit the highly specific needs of each construction company, which can result in excessive customization and difficulty scaling beyond niche markets (Fuller, 2024).

As Dubov (2022) notes, construction technology also faces challenges from lack of standardization, complex approval processes, and supply chain instability. While tools like Building Information Modeling (BIM), drones, and prefabrication can help streamline processes and increase efficiency, the implementation of these technologies requires careful consideration of training, hardware, and software costs. Moreover, integrating new technology into a company's existing workflow can be difficult, requiring a clear strategy for adoption and ROI metrics to justify the investment (Dubov, 2022).

These multifaceted challenges, ranging from securing adequate funding (ZACUA Ventures, 2025) to navigating complex market entry barriers and achieving widespread adoption (Fuller, 2024), collectively represent significant hurdles that ConTech startups must overcome. Addressing these obstacles is crucial to unlock their transformative potential within the construction industry. This leads us to the research questions, which will explore solutions for empowering startups in the construction industry and guide civil engineers toward entrepreneurial success.

3. Method

This chapter outlines the methodological approach used to explore the applicability and limitations of existing startup methodologies in the construction technology (ConTech) sector. It details the research design, data collection process, and analytical framework adopted to develop and validate the refined ConTech startup blueprint.

3.1 Research Design

The study adopts a qualitative-dominant mixed methods approach (Creswell & Plano Clark, 2018) that combines both primary and secondary sources of data. The primary research consists of semi-structured interviews (Kallio et al., 2016) with key stakeholders in the ConTech ecosystem, including startup founders, investors, and business developers. This qualitative dimension provides first-hand insights into the startup journey, including pain points, adaptation strategies, and real-world deviations from established methodologies.

In parallel, the research incorporates secondary data analysis, including academic literature, market reports, statistical sources, and existing startup frameworks such as *The Lean Startup* (Ries, 2011), *The Startup Owner's Manual* (Blank & Dorf, 2012), and *Disciplined Entrepreneurship* (Aulet, 2019). The evaluation of these existing frameworks was conducted using principles of Framework Analysis (Ritchie & Spencer, 2002), which allows for systematic comparison against criteria derived from the specific context of ConTech. This dual-pronged approach enables both contextual depth and theoretical breadth, supporting the creation of a framework grounded in empirical practice yet informed by scholarly discourse.

The choice of this research design is motivated by the need to bridge theory and practice, to understand not only what the literature prescribes but also how startups actually navigate formation and scaling in a high-regulation, hardware-intensive industry such as construction.

3.2 Data Collection

Primary Data

The primary data was gathered through semi-structured interviews conducted with six professionals operating in or adjacent to the ConTech sector:

- **CEO 1** – Founder & CEO at Alga Insulation
- **Angel Investor 1** – Angel Investor & Office Manager at FOJAB
- **CEO 2** – CEO at MustaLiitu
- **Angel Investor 2** – Angel Investor & Business Developer
- **Management Consultant 1** – Senior Management Consultant at Knowit
- **Business Developer 1** – Head of Business Development and Innovation at Incoord

Interviews were conducted in-person or via video conferencing and recorded with the consent of participants. Each session ranged between 30 to 60 minutes and followed a thematic guide tailored to capture insights on startup formation, team building, funding strategies, market validation, and regulatory navigation.

Secondary Data

Secondary data sources include academic publications, industry reports, foundational texts on startup methodologies, and public case studies of ConTech startups. The collection and selection of these secondary sources were guided by a systematic literature review approach (Tranfield et al., 2003). Key academic databases such as Scopus, Web of Science, and Google Scholar, along with targeted searches of reputable industry publication portals, were utilized.

Search strategies employed keywords such as 'ConTech,' 'construction technology,' 'startup methodology,' 'Lean Startup in construction,' 'Disciplined Entrepreneurship in ConTech,' 'civil engineering entrepreneurship,' 'ConTech challenges,' and 'ConTech innovation.' Inclusion criteria prioritized peer-reviewed academic articles and authoritative industry reports published primarily between 2020 and 2025 to ensure contemporary relevance, alongside seminal works for the startup methodologies under critical review.

Thematic synthesis of the selected literature aimed to identify established theories, current industry dynamics, the core tenets of dominant startup frameworks, and documented challenges specific to the ConTech sector. These sources support triangulation, allowing for comparison between best-practice frameworks and real-world behavior, and enriching the overall robustness of the findings.

3.3 Data Analysis

The analysis combined thematic coding of qualitative interview data with a framework-based evaluation of the methodologies in question. Interview transcripts were reviewed and coded according to recurring themes such as market validation, regulatory complexity, team formation, product development, and funding strategy, following the thematic analysis process outlined by Braun and Clarke (2006).

A comparative analysis was conducted to map the actions of interview participants against the structured steps of the three selected startup methodologies. This evaluation utilized a framework analysis approach (Ritchie & Spencer, 2002), where the specific needs and contextual factors of ConTech startups, derived from both literature and the primary interview data, formed the analytical framework against which each startup methodology was systematically assessed for its applicability and limitations.

The culmination of this analytic process was the construction of a contextualized startup blueprint tailored for ConTech ventures. The blueprint's design was iteratively refined, and its relevance and applicability were qualitatively validated through a multi-faceted approach: a critical analysis of existing startup methodologies, the incorporation of empirical insights from expert interviews, and its detailed application and testing in a real-world ConTech startup case study (Permitt.ai, presented in Appendix A), thereby employing principles of methodological triangulation and case study validation (Yin, 2018).

3.4 Limitations of the Study

While this research provides a contextually grounded and empirically informed blueprint for early-stage ConTech startup development, several limitations must be acknowledged. First, the refined ConTech Startup Blueprint proposed and evaluated in this thesis has been primarily applied to and validated through software-based or digital-first startup cases. As such, its applicability to hardware-intensive ventures, such as those involving physical construction materials, robotics, or large-scale infrastructure technologies, remains untested within the scope of this study. The unique prototyping cycles, certification demands, and capital requirements of hardware-focused ConTech startups may necessitate additional adaptations to the proposed framework.

Second, although six expert interviews provide a strong qualitative foundation, the study's empirical base remains limited in sample size and geographical scope, with all participants operating within or closely linked to the Swedish and Nordic ConTech ecosystem. This regional specificity, while appropriate for the scope of this thesis, may limit the generalisability of the findings to other regulatory or market environments.

Additionally, the validation of the blueprint has been conducted primarily through its real-world application in a single live case study, **Permitt.ai**, which, while offering rich insights, reflects only one implementation trajectory. The diversity of startup journeys, especially across different construction sectors (e.g., commercial real estate vs. civil infrastructure), calls for further longitudinal research across multiple ventures to assess the robustness and adaptability of the framework over time.

Finally, due to the exploratory and practice-oriented nature of this thesis, the research does not offer formal statistical generalization but instead provides a transferable conceptual model grounded in qualitative data. Future studies may complement this work by employing broader survey methods, cross-sectoral comparisons, or controlled experimentation to further evaluate the efficacy and limitations of the blueprint across different entrepreneurial contexts.

3.5 Use of Generative AI Tools

Beyond the study's inherent limitations, it is also pertinent to address the methodology of manuscript preparation, specifically the use of generative AI tools. Generative Artificial Intelligence (AI) tools, specifically ChatGPT (OpenAI, version GPT-4), were employed as an assistive technology during specific phases of preparing this thesis manuscript. This usage was conducted responsibly and transparently, strictly adhering to the Chalmers University of Technology's guidelines on AI tool use in thesis work (Chalmers University of Technology, 2024). This approach acknowledges the institutional framework wherein examiners determine the parameters for AI use and underscores a commitment to university standards.

The assistive applications of generative AI in this thesis were focused on: refining the language (improving clarity, conciseness, and academic tone) of author-drafted text; summarizing the author's own extensive notes or draft sections to aid in review and synthesis; and brainstorming potential organizational structures for arguments or sections, based on core ideas and detailed prompts

provided by the author. All AI assistance was directly supervised and critically reviewed by the author.

All outputs from these AI tools were treated as preliminary suggestions. The author meticulously reviewed, critically evaluated, fact-checked, and substantially edited all AI-assisted text to ensure its accuracy, originality, and alignment with the research objectives. This critical engagement aimed to prevent over-reliance on AI outputs and reinforced AI's role purely as a supportive instrument. The author retains full and sole responsibility for the intellectual content, arguments, accuracy, and final expression of this thesis, ensuring it meets all standards of academic rigor and integrity, and is prepared to justify all choices regarding its content.

4. Theory and Literature Study

4.1 What is a construction tech startup (Contech Startup)

The construction industry has historically been slow to innovate, creating an ideal landscape for startups focused on digitization and technological advancements. These Contech startups aim to drive meaningful change by integrating solutions like AI, IoT, and automation to meet evolving industry demands. Successful Contech startups balance innovation with adaptability, crafting solutions that not only address current challenges but are also flexible enough to grow with the industry's technological advancements (BigRentz, 2024).

4.1.1 Definition of a Contech Startup

A Contech startup is an innovative business focused on addressing common challenges within the construction industry by creating new technologies or improving existing processes. According to BigRentz (2024), the primary goal of these startups is to introduce novel products or services that tackle pain points in the industry, such as inefficiency or safety issues. This often involves identifying gaps in current practices and offering technology-driven solutions optimized for the target audience.

Construction technology encompasses a wide range of advanced tools and methods used to improve workplace efficiency, safety, and project sustainability. Dusty Robotics (2023) explains that these technologies include smart equipment, project management apps, and 3D printing. These technologies streamline the construction process, making pre-construction tasks like bid management and document organization more efficient, while also providing innovative building techniques such as autonomous machinery and digital schematics.

4.1.2 Types of Contech Startups

CEMEX Ventures (2024) has identified four market-driven focus areas to categorize Contech startups and solutions. These focus areas reflect the diverse and innovative nature of tech startups in the construction industry. Each category highlights specific innovation goals and the unique approaches these startups take to solve industry challenges. Below are the four key types of construction technology (Contech) startups that are driving advancements across the sector:

1. **Green Construction (Sustainable)** These startups focus on decarbonizing the built environment and promoting sustainability through the use of renewable energy, recycling, and sustainable materials. Their goal is to create eco-friendly cities and construction practices aligned with global sustainability goals.
2. **Enhanced Productivity (Efficient)** Startups in this category aim to improve productivity and efficiency in construction processes by leveraging data-driven solutions, improving collaboration, and introducing tools for project management, geotechnical analysis, and more.
3. **Construction Supply Chain (Agile)** These startups focus on optimizing the supply chain in construction by ensuring the timely delivery of resources, improving inventory management, and enhancing logistics and fleet management to streamline construction processes.
4. **Future of Construction (Disruptive)** This type includes startups innovating with cutting-edge technologies such as robotics, 3D printing, and modular construction. They aim

to revolutionize the industry by enhancing productivity and efficiency through automation and industrialized processes.

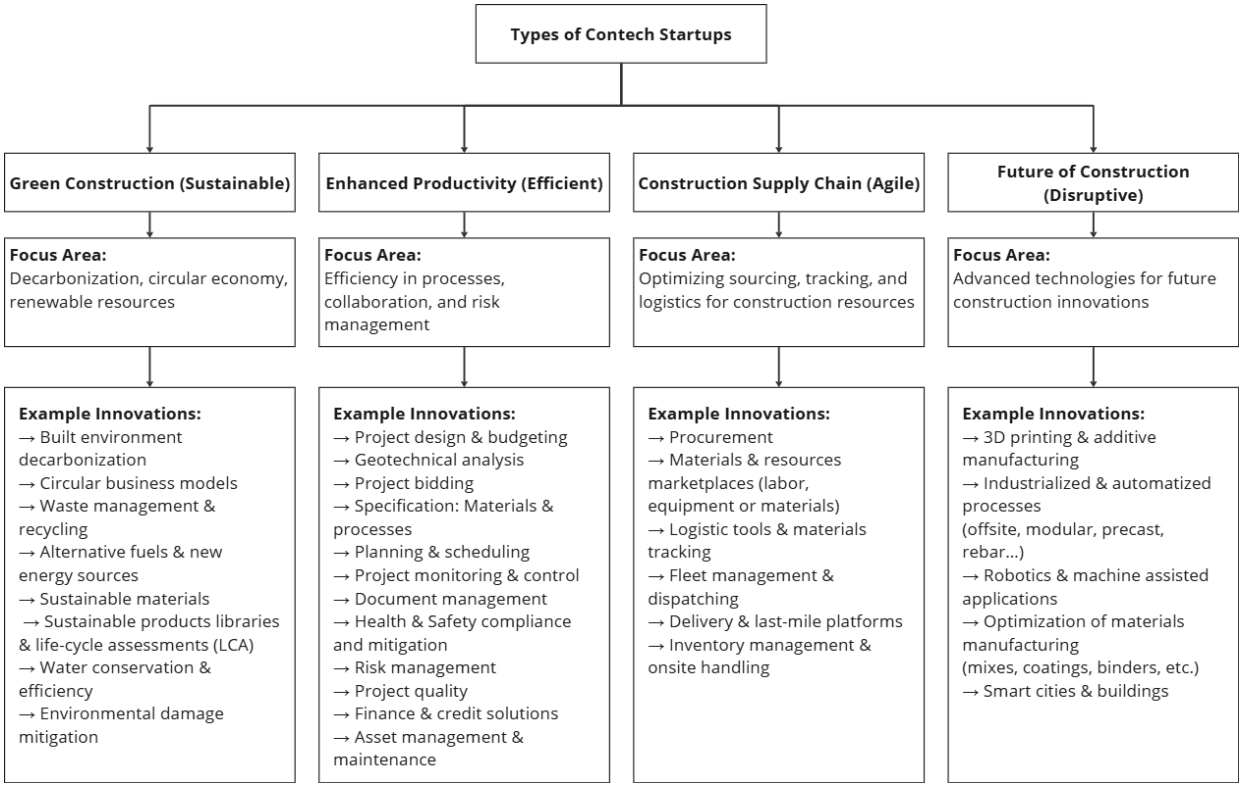


Figure 1: *Summary of the Types of Contech Startups (Author figure based on CEMEX Ventures (2024))*

4.1.3 Characteristics of Successful Tech Startups

The foundation of a successful technology startup, particularly within the specialized and often risk-averse ConTech sector, lies in a confluence of factors that extend beyond a singular innovation (ZACUA Ventures, 2025). While the ability to address an existing, well-defined industry problem with a novel and effective solution is paramount (Neuroject, 2025), Kovalov et al. (2024) emphasize that comprehensive market research to understand the target audience and competitive environment is equally vital for positioning these innovations. Indeed, investors in ConTech increasingly prioritize clear differentiation and a demonstrable understanding of specific industry pain points (ZACUA Ventures, 2025).

A cohesive, skilled, and adaptable team is consistently highlighted by investors as perhaps the most critical success factor for early-stage ventures (ZACUA Ventures, 2025). In the ConTech domain, this often translates to a founding team that blends deep industry-specific knowledge (e.g., construction processes, regulatory landscapes) with technological proficiency and strong business development capabilities to navigate complex sales cycles and build trust within the industry (Kovalov et al., 2024). The ability of the team to execute its vision and adapt to market feedback is a key determinant of a startup's trajectory.

Many startups, adhering to principles from methodologies like the Lean Startup (Ries, 2011), begin by developing a Minimum Viable Product (MVP). The purpose of the MVP is not to be a perfect, feature-complete offering, but rather to be the simplest version of the product that allows the startup to test its core value hypothesis with real users, gather actionable feedback, and achieve validated learning (Ries, 2011). For ConTech startups, an MVP might also serve to demonstrate initial traction or technical feasibility, which are crucial milestones for attracting early-stage investment (ZACUA Ventures, 2025).

A robust Go-To-Market (GTM) strategy, encompassing targeted marketing and effective sales processes, is crucial for gaining visibility and acquiring customers, particularly in an industry as fragmented and relationship-driven as construction (ZACUA Ventures, 2025). Kovalov et al. (2024) note the importance of building trust by fulfilling promises. This aligns with the need for ConTech startups to clearly articulate their value proposition and demonstrate reliability to overcome the industry's inherent resistance to unproven solutions.

Similarly, according to Kovalov et al. (2024) flexibility and continuous improvement are vital for the long-term survival of startups. By constantly adapting to feedback, analyzing data, and staying agile, Contech startups can evolve their products to meet the changing demands of the market.

In essence, startups thrive when they combine innovation, strategic planning, and adaptability (Kovalov et al., 2024). These principles, while universally applicable, are especially relevant in the construction tech sector, where startups face additional challenges such as industry fragmentation and slow technology adoption.

A prominent example of a successful startup in the construction technology space is Digital Transformation Systems (DTS), a Czech startup that focused on digitizing construction companies. Established in 2019, DTS capitalized on the increasing demand for digital solutions in the construction industry, particularly with technologies like 3D Building Information Modeling (BIM) and data integration services. The founder, Milan Moravec, emphasized key factors that contributed to DTS's success, including strong industry contacts, deep knowledge of market needs, and the ability to adapt their products to customer requirements (Vitvarová, 2024).

In the case of DTS, adaptability and the ability to respond to customer feedback played a significant role in the startup's growth. By maintaining a close relationship with customers and providing comprehensive services, DTS not only developed a viable product but also built a strong reputation in the market. The startup's focus on structured data and digitization allowed it to offer services that optimized construction processes, making them more efficient and reducing costs. These success factors align with broader research and highlight the importance of innovation, market understanding, and a customer-centric approach as critical components for the growth of startups in the construction sector (Vitvarová, 2024).

Figure 2: *Summary of the Characteristics of Successful Tech Startups (Author figure)*

Understanding these key characteristics not only defines what makes a Contech startup successful but also lays the groundwork for exploring how these startups interact with different organizational structures within the construction industry, as discussed in the next section.

4.2 Centralized vs. Decentralized: How Contech Startups Address Industry Challenges

To understand how Contech startups address challenges in the construction industry, it is important to explore the theories behind centralized versus decentralized approaches to technology and innovation. These organizational models offer distinct frameworks for managing change, innovation, and technology integration within companies, including those in the construction sector. Understanding these approaches helps Contech startups tailor their solutions to fit the needs of their clients, whether those clients are large centralized organizations or smaller, decentralized, project-specific firms.

4.2.1 Centralized Approaches

A centralized approach to innovation and organizational change is characterized by top-down decision-making, with authority concentrated at the highest levels of management. This structure ensures consistency and uniformity across the entire organization (Campbell et al., 2011). In such settings, the adoption of new technologies, such as Building Information Modeling (BIM) or AI-driven project management systems, is guided by senior leadership, who enforce standards and oversee the implementation of these technologies (OpenAsset, 2024).

For Contech startups, working with companies that use a centralized structure offers the potential to roll out innovations across multiple sites and projects in a controlled manner. These companies benefit from standardized applications of technology, ensuring that processes are optimized, costs are controlled, and large-scale projects are efficiently managed. This widespread, uniform adoption

can help address industry challenges by ensuring that advanced technologies are integrated consistently across the organization (OpenAsset, 2024).

However, despite the promise of centralized systems, the construction industry is inherently complex and fragmented, with numerous stakeholders involved in every project. This complexity can make it difficult to implement new technologies due to the need to integrate multiple systems and processes. Additionally, each construction company and project type has its own unique requirements, which may not always align with centralized models (EARTHBRAIN Ltd, 2024).

4.2.2 Decentralized Approaches

Conversely, a decentralized approach to organizational change emphasizes distributed decision-making, where control is shared across various levels of the organization. In this model, individual departments or project teams have the autonomy to make decisions about adopting and utilizing new technologies. Decentralized systems are generally more agile, allowing them to respond better to specific project needs or local conditions (Campbell et al., 2011).

In the construction industry, where projects often face site-specific challenges, a decentralized approach allows for greater flexibility. Contech startups that work with decentralized companies can collaborate closely with project managers to implement solutions that are tailored to each project's demands. For instance, startups providing robotics for repetitive tasks or IoT sensors for on-site monitoring may find more success in decentralized organizations, where decision-making occurs at the project level. This flexibility can help address labor shortages, safety concerns, and delays by allowing teams to experiment with new tools and technologies in real-time (OpenAsset, 2024).

Although decentralized systems encourage innovation by empowering employees at all levels to contribute to decision-making, the construction industry still relies heavily on manual processes and paper-based systems. Many construction firms continue to use traditional plans and blueprints, which can be time-consuming and error-prone. This reliance on manual methods makes it challenging to adopt new technologies, especially when workers are resistant to changing long-standing practices. Additionally, with strained labor markets, slim profit margins, and tight schedules, many managers and owners are reluctant to invest in modern technology due to uncertainties about its success (EARTHBRAIN Ltd, 2024).

4.2.3 Adaptability and Product Customization

Successful startups employ strategies to ensure that their solutions fit the unique needs of both centralized and decentralized construction companies, often by focusing on user experience, seamless workflow integration, and demonstrable immediate value, especially as the novelty of new technologies fades in favor of practical application (SiteLink AI, 2024). Understanding the project-oriented operating model prevalent in the construction industry is more critical than focusing solely on whether a company is centralized or decentralized. The key is to identify how products or services can be tailored to meet the specific needs of individual projects, for instance, addressing specific sustainability targets demanded by clients (Deltek, 2024), while maintaining a cohesive strategy across the organization.

The increasing adoption of process-enabled Software as a Service (SaaS) models in ConTech facilitates this by offering both scalability and the flexibility to configure solutions to varying project requirements (SiteLink AI, 2024). Developing products in close collaboration with customers is essential, regardless of the organizational structure (Neuroject, 2025). By working directly with those who will use the technology, often at the project level, startups can create solutions that address real-world challenges and are more readily adopted. This customer-centric approach allows for necessary customization and builds trust, which is crucial for technology adoption in the construction industry (Gleeds, 2024).

4.2.4 Addressing Industry Challenges

Both centralized and decentralized firms differ in how they tackle issues like labor shortages, cost overruns, and delays. In centralized firms, labor shortages can be mitigated through the widespread use of automation and robotics, where large-scale adoption of these technologies can reduce labor demands across multiple projects (OpenAsset, 2024). Decentralized organizations, on the other hand, might implement autonomous machinery for specific, labor-intensive tasks, allowing them to tackle local labor shortages on a project-by-project basis.

Moreover, according to OpenAsset (2024) Understanding the nuances of centralized and decentralized organizational structures is crucial for Contech startups aiming to address industry challenges effectively. Centralized approaches offer the advantage of uniform adoption and consistent implementation of technologies across an organization, which can be beneficial for large-scale problem-solving. Decentralized approaches provide flexibility and allow for tailored solutions that meet specific project needs, facilitating innovation at the grassroots level.

By understanding whether a construction firm operates under a centralized or decentralized model, Contech startups can tailor their approaches accordingly. This strategic alignment is crucial for effective product customization and adoption, building upon the importance of adaptability highlighted in section 4.1.3 and informing the funding strategies discussed in section 4.3.

4.3 Financing and Funding

Startup funding is a critical aspect of launching and scaling a new business. Early-stage companies typically have minimal revenues and require external financial resources to transform their ideas into sustainable business models. The funding journey for a startup involves various phases, and each phase is associated with different types of financing, therefor It is essential for founders to understand the range of options available and to carefully consider which method aligns with their business goals, market conditions, and growth strategy (re:cap Technologies GmbH, 2024).

4.3.1 Types of Startup Funding

Different funding sources provide specific advantages and limitations, depending on the stage of development a startup is in. Founders must evaluate each option based on the amount of capital required, the timeline for scaling the business, and their willingness to relinquish control or equity.

Bootstrapping

Bootstrapping refers to funding a startup with its internal resources, including the founders' personal savings or early revenues. This method enables entrepreneurs to maintain full control over the company since no external investors are involved. However, bootstrapping requires strict financial discipline, as startups must operate within limited budgets and aim to generate revenue as quickly as possible to maintain cash flow (re:cap Technologies GmbH, 2024). While bootstrapping minimizes external interference, it often leads to slower growth compared to startups with access to venture capital or other external investments.

Family and Friends

Securing initial funding from family and friends is a common strategy in the early stages of startup development. This approach offers flexibility in terms of repayment and interest rates, as well as a more personalized level of trust and support. Funds from family and friends are typically smaller, ranging from €5,000 to €20,000, and may take the form of interest-free loans or equity investments (re:cap Technologies GmbH, 2024). However, relying on personal connections can place emotional strain on relationships if the business faces financial difficulties.

Accelerators and Incubators

Accelerators and incubators are popular funding options for early-stage startups. These programs provide not only financial support but also mentorship, networking opportunities, and access to industry experts. Accelerators are short-term, intensive programs designed to help startups refine their business models and rapidly grow over a period of several months. In exchange for equity, startups typically receive funding between €20,000 and €100,000 (re:cap Technologies GmbH, 2024). Incubators, by contrast, offer longer-term support, often lasting several years, with a focus on helping startups establish a solid foundation and navigate market entry challenges.

Venture Capital (VC)

Venture capital (VC) is one of the most well-known funding methods for startups, particularly for those in the growth phase. Venture capital firms provide large sums of equity financing, often in the range of €100,000 to several million euros, in exchange for a significant ownership stake and decision-making rights in the company (re:cap Technologies GmbH, 2024). While VC funding allows startups to scale rapidly, it comes at the cost of diluting the founders’ control over the business. Furthermore, VC investors typically expect high returns on investment and plan for an exit, such as through an initial public offering (IPO) or a sale of the company, within a specific time frame (re:cap Technologies GmbH, 2024).

Business Angels

Business angels are private investors who provide early-stage funding, usually in exchange for equity. They often invest smaller amounts compared to venture capital firms, typically ranging between €10,000 and €500,000. Beyond financial support, business angels also offer valuable experience, industry connections, and strategic advice, which can be critical for startups in the seed phase (re:cap Technologies GmbH, 2024). Angel investors often serve as a bridge to later funding rounds, including venture capital, and can help startups prepare for their Series A funding.

Company Builders

Company builders take a more hands-on approach to startup development, providing not only capital but also operational support. These organizations often develop the business ideas themselves, offering a full team to manage the startup's core operations, including development, marketing, and scaling. This type of support can help startups grow rapidly, but founders may have limited control over the company's strategic direction due to the strong involvement of the company builder (re:cap Technologies GmbH, 2024).

Venture Debt

Venture debt is a form of financing used by startups to supplement their equity funding. Unlike venture capital, venture debt does not dilute the founders' equity, but it does require regular repayments with interest. This option is typically used during later stages of growth to maintain liquidity between rounds of equity financing, with amounts ranging from €100,000 to several million euros (re:cap Technologies GmbH, 2024). However, venture debt can be costly due to high-interest rates and additional conditions such as warrants, which allow lenders to purchase equity later.

Bank Loans

While bank loans are a common financing option for established businesses, they are less accessible to startups due to the inherent risks involved. Banks typically require a proven business model, steady revenues, and tangible assets as collateral, criteria that many early-stage startups cannot meet. For the few startups that qualify, bank loans offer fixed repayment terms and interest rates, allowing for better financial planning (re:cap Technologies GmbH, 2024).

Crowdfunding

Crowdfunding platforms enable startups to raise capital from a large number of individual investors. This funding model is typically divided into three types: reward-based, equity-based, and debt-based crowdfunding. Each method allows startups to raise small amounts of money from many contributors, making it an accessible option for early-stage ventures. Crowdfunding also provides an opportunity for startups to validate their product idea with the market before investing significant resources (re:cap Technologies GmbH, 2024).

Startup Competitions

Startup competitions provide early-stage ventures with the opportunity to pitch their ideas to a panel of experts in exchange for prize money and feedback. These competitions are an excellent way for startups to gain visibility and secure small amounts of funding, typically between €10,000 and €50,000. Beyond the financial benefits, these competitions also offer valuable networking opportunities and validation from industry professionals (re:cap Technologies GmbH, 2024).

University Programs

Many universities offer grants, scholarships, and other forms of support to student-led startups. These programs typically do not provide direct capital but offer resources such as coaching, technical equipment, and office space, allowing students to develop their business ideas while completing their education. University programs are an excellent way for startups to gain early-stage support without giving up equity (re:cap Technologies GmbH, 2024).

4.3.2 Alternative Debt Funding

For startups that prefer to avoid diluting equity, alternative debt funding has emerged as an attractive option. This method, which includes revenue-based financing (RBF) and recurring revenue financing (RRF), enables startups to borrow money based on their revenue streams without giving up shares in the company (re:cap Technologies GmbH, 2024). Startups agree to repay a portion of their revenues each month, making this a flexible form of funding that adjusts to the company's cash flow.

4.3.3 Convertible Loans

Convertible loans offer another form of flexible financing for startups. Investors provide debt capital with the option to convert the loan into equity during a future funding round. This method is particularly useful for startups with existing investors who are familiar with the business model and confident in its growth potential (re:cap Technologies GmbH, 2024). Convertible loans also allow startups to postpone discussions about valuation, making them a popular choice during uncertain economic times.

Understanding the various financing options available to startups is crucial for founders seeking to scale their businesses effectively. From bootstrapping and family contributions to more formal investment methods like venture capital and convertible loans, each funding type comes with specific trade-offs in terms of control, equity dilution, and growth potential. Ultimately, the choice of funding must align with the startup's current phase, long-term objectives, and market conditions (re:cap Technologies GmbH, 2024).

Table 3: *Summary of the Startup funding instruments and matching stage (based on (re:cap Technologies GmbH, 2024).*

Startup Stage	Early Stage	Early Stage	Early Stage	Growth Stage	Growth Stage	Growth Stage	Later Stage	Later Stage
Phase	Stealth Mode	Pre-seed	Seed	Series A	Series B	Series C	Series D	Series E
Bootstrapped	✔	✔	✔	✔	✔	✔	✔	✔
Family & Friends	✔	✔						
Accelerator			✔					
Incubator	✔	✔	✔	✔	✔	✔		
Company Builder	✔	✔	✔	✔	✔	✔		
Business Angels	✔	✔						
Venture Capital		✔	✔	✔	✔	✔	✔	✔
Venture Debt				✔	✔	✔	✔	✔
Modern Debt Funding			✔	✔	✔	✔	✔	✔
Convertible Loan			✔	✔	✔	✔	✔	✔
Crowdfunding/investing	✔	✔	✔					

Bank Loan							✔	✔
Development Loan			✔	✔	✔			
Startup Competition	✔	✔	✔					
University Programs	✔	✔	✔					

4.3.4 Balancing Growth and Control

As a company grows, the funding landscape changes. Startups must balance the need for growth capital with the desire to retain control over their company, a fundamental decision point in the entrepreneurial journey (HSBC Innovation Banking, 2024). Equity financing, such as venture capital (VC), can provide substantial funds for scaling but often requires relinquishing significant ownership and decision-making power (AccountancyCloud, 2024). Conversely, bootstrapping or relying on debt financing allows founders to maintain fuller control but may limit the pace of expansion or require regular repayments, potentially with high-interest rates (HSBC Innovation Banking, 2024).

As startups navigate these complexities, balancing growth aspirations with control considerations becomes paramount. This balance is influenced by the organizational dynamics of their target markets (see section 4.2) and the need for strategic planning and adaptability outlined in section 4.1.3. Furthermore, funding decisions can significantly impact the choice and innovation of business models, a topic explored in section 4.4.

4.3.5 ConTech Startup Investment Trends (2023-2025)

The investment landscape for Construction Technology (Contech) startups is dynamic, characterized by rapid shifts in investor focus, deal volumes, and regional concentrations. While an analysis of 2023 data provided initial insights into market behavior (CEMEX Ventures, 2024), a more current perspective incorporating 2024 figures and early 2025 trends is essential for understanding the present opportunities and challenges for Contech ventures.

Evolution from 2023 to 2024

Despite facing a challenging economic environment, Contech investment remained resilient in 2023. The total number of deals reached 236, marking a 3.5% increase from 2022, even though the total investment dropped by 44%, from $5.38 billion in 2022 to $3.03 billion in 2023. This decline in total capital invested reflects lower valuations and a shift toward earlier-stage investments, as investors sought to hedge their risk by focusing on smaller, growth-oriented startups (CEMEX Ventures, 2024).

The year 2024 marked a period of resilience and growth. Overall Contech investment reached approximately $3.1 billion across 325 deals, indicating a significant 38% increase in the number of transactions and a modest 2.3% rise in the total amount invested compared to 2023 (CEMEX Ventures, 2025). This growth occurred despite prevailing macroeconomic uncertainties, demonstrating sustained investor confidence in the industry's potential. In terms of focus areas by

deal volume in 2024, 'Enhanced Productivity' solutions were dominant, accounting for 47% of total deals, followed by 'Green Construction' with 24% (World Cement, 2025). North America continued to be a major hub, accounting for 60% of total ConTech investment in 2024 (ZACUA Ventures, 2025).

Early 2025 Investment Climate and Emerging Trends

The positive momentum appears to be continuing into 2025. In the first quarter of 2025 alone, total investment in Contech and Cleantech reached $1.39 billion across 99 deals, an 85% increase in the number of transactions compared to Q1 2024 (CEMEX Ventures, 2025). This robust start to the year suggests growing investor optimism.

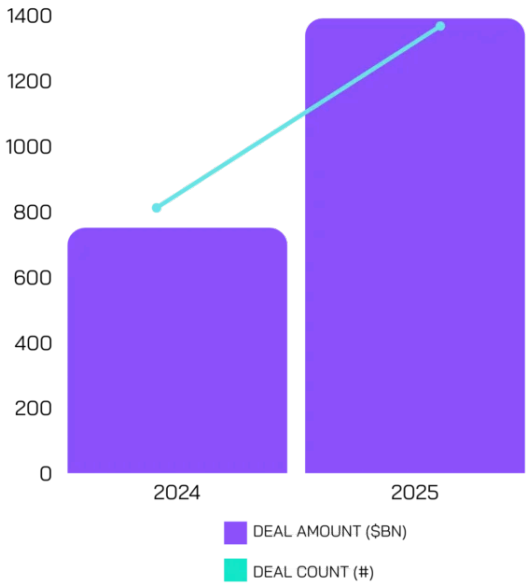


Figure 3: *Total investment volume in Q1 2025 Compared to Q1 2024 (CEMEX Ventures, 2025)*

Key investment distribution trends in Q1 2025 include (CEMEX Ventures, 2025)

Focus Areas: 'Green Construction' attracted the largest share of investment (36%), closely followed by 'Enhanced Productivity' (33%). Notably, 'Construction Supply Chain' solutions saw a significant jump in investment, capturing 19% (up from 8% in Q1 2024), while 'Future of Construction' technologies accounted for 12%. This highlights a continued emphasis on sustainability and efficiency, with an emerging recognition of the critical need for innovation in construction logistics and supply chains.

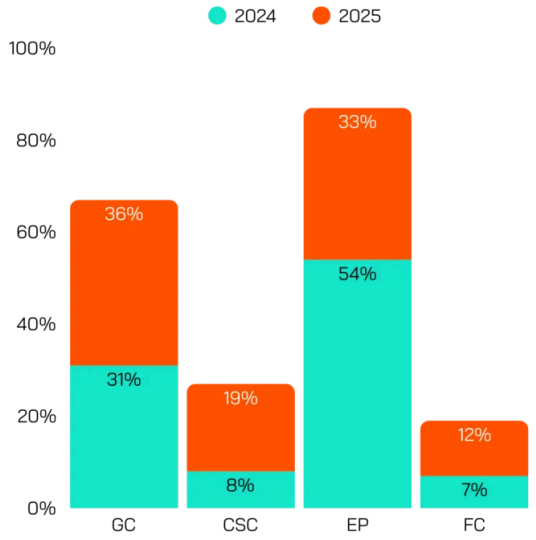


Figure 4: *Investment Deals by Focus Areas, 2024-2025 (CEMEX Ventures, 2025)*

Regional Distribution: In Q1 2025 investment outlook, the North America remained the dominant region, securing 80% of investments compared to 2024 of securing 49% of the deals. Europe accounted for 14% of Q1 2025 deals, while in 2024 reached 32% of the deals, and the Asia Pacific (APAC) region for less than 2% in Q1 2025 while 2024 reached 12% of the deals. The United States, India, Germany, and France were the top countries by investment amount.

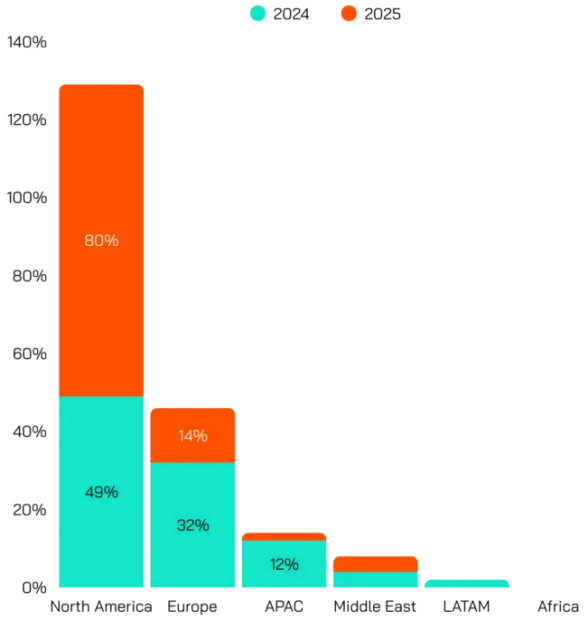


Figure 5: *Regional Distribution of Contech Investment, 2024-2025 (CEMEX Ventures, 2025)*

Shifting Investor Sentiment and Technological Focus for 2025

Investor sentiment for Contech in 2025 is largely positive. A survey of 130 global Contech investors revealed that 47% plan to increase their capital deployment in 2025, with an additional 43% intending to maintain current levels (ZACUA Ventures, 2025). This indicates a recovery in

early-stage Contech investment sentiment. Furthermore, 79% of these investors anticipate that valuations will either remain constant or increase in 2025, suggesting that early-stage Contech valuations may have bottomed out in 2024 and are poised for growth (ZACUA Ventures, 2025).

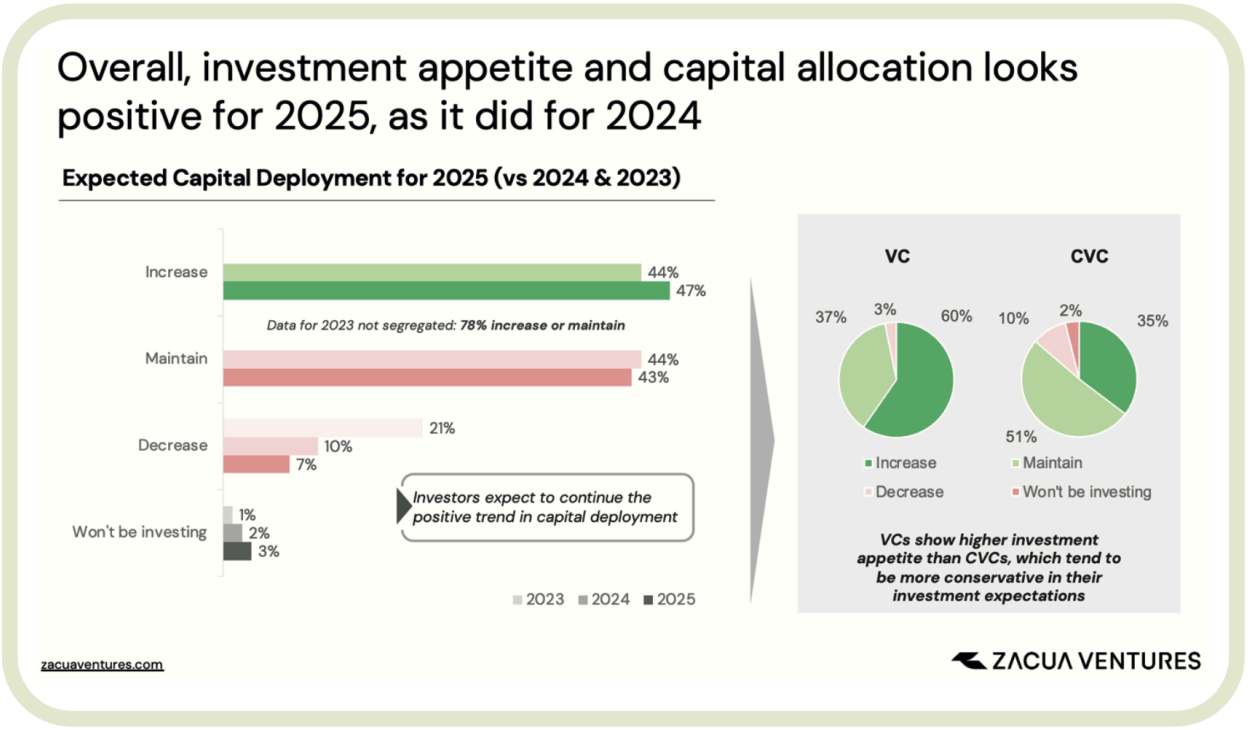


Figure 6: *Investors interest in maintaining their investment in 2025 (ZACUA Ventures, 2025)*

A significant trend for 2025 is the evolution in technological focus. For the first time, Artificial Intelligence (AI) has emerged as the leading technology area for planned increased investment, with 56% of investors looking to allocate more funds here. Robotics also saw a notable rise in interest (34%). While interest in sustainability remains strong (48% planning increased investment), it has been displaced from the top spot it held in 2024 (ZACUA Ventures, 2025). This shift suggests a growing market preference for technologies that offer immediate ROI and efficiency gains, such as AI and robotics, which can address issues like skilled labor shortages and productivity bottlenecks.

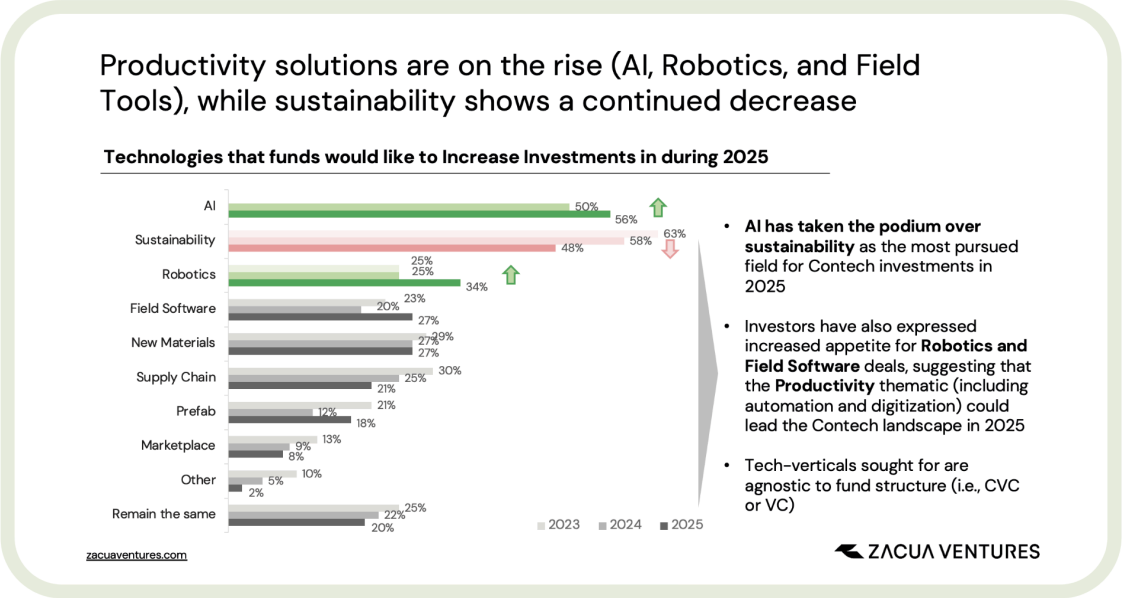


Figure 7: *Investors interest by Focus Areas, 2025 (ZACUA Ventures, 2025)*

Understanding these recent shifts, from evolving investment volumes and regional activities to changing technological priorities and investor sentiment, is crucial for Contech startups. It informs their fundraising strategies, product development roadmaps, and overall market positioning, making an up-to-date analysis of the investment landscape highly relevant.

Investment by Deal Type

The economic challenges of 2023 had a noticeable impact on the types of deals occurring within the Contech sector. Early-stage investments, particularly in seed and Series A funding rounds, increased by nearly 19%, highlighting investor preference for smaller, earlier-stage startups with high growth potential. Conversely, later-stage deals saw a marked slowdown, which contributed to the overall decline in total capital invested in the sector (CEMEX Ventures, 2024).

Moreover, in 2024, the trend of early-stage investments has continued, unquestionably in Series Seed, outpacing those from 2023 by 24%, as well as Series A, highlighting that investors are still actively searching for new, more sophisticated solutions. At the same time, later-stage deals, typically associated with higher valuations, saw a slight increase compared to the previous year, with an increase in Later Stage Rounds, and M&A funding albeit from a fairly low base (CEMEX Ventures, 2025).

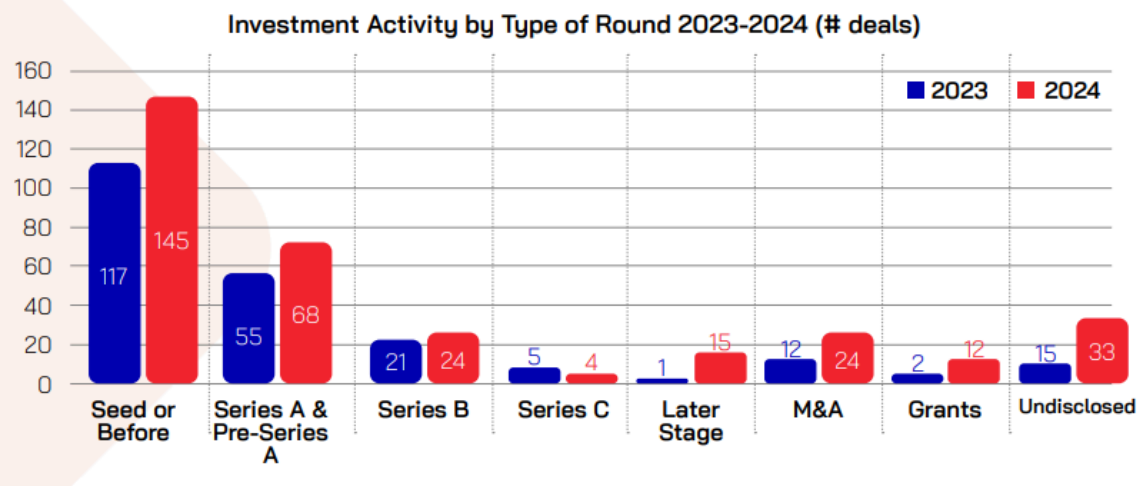


Figure 8: *Investment Activity by Type Of Round, 2023-2024 (CEMEX Ventures, 2024)*

The Contech investment landscape in 2023-2025 illustrates the industry's growing importance within the venture capital ecosystem, despite challenges posed by global economic conditions. The increase in early-stage deals and the growing focus on sustainable technologies indicate that Contech startups are well-positioned to drive innovation and transformation in the construction sector. As the industry continues to embrace digital tools and sustainable practices, it is expected that Contech's share of the venture capital market will continue to expand in the coming years, paving the way for further disruption in the construction industry (CEMEX Ventures, 2024, 2025).

4.4 Business Models and the Importance of Innovation

A business model provides a comprehensive framework for how a company creates and captures value by defining the "Who," "What," "How," and "Why" of its operations (Gassmann et al., 2014). The core purpose of a business model is to identify the target customers (Who), determine the value proposition (What), outline the processes and resources required to deliver that value (How), and explain how the business generates profits (Why). These components form a holistic system that allows organizations to offer products or services while ensuring long-term financial viability.

Figure 9: *Business model innovation (Author Figure based on Gassmann et al., (2014))*

Innovating a business model requires rethinking at least two of these four dimensions, leading to significant transformation not only in how companies operate but also in how they compete. This is more than just introducing new products or technologies; it involves reshaping how businesses function at their core to adapt to changing market conditions and consumer needs (Gassmann et al., 2014).

4.4.1 The Need for Business Model Innovation (BMI)

The imperative for Business Model Innovation (BMI) has intensified in the contemporary business environment, which is characterized by rapid technological evolution, shifting market dynamics, and evolving consumer preferences (Adewumi et al., 2024; Business Model Innovation Review, 2024). Traditional business models, even those historically successful, face increasing pressure to adapt or risk obsolescence. Indeed, the capacity to innovate business models is considered a crucial dynamic capability, enabling firms to sense and seize opportunities amid uncertainty and rapid change (Teece, 2010, as cited in Adewumi et al., 2024).

A primary driver for this heightened need for BMI is the transformative potential of emerging technologies such as artificial intelligence (AI), the Internet of Things (IoT), and blockchain (Adewumi et al., 2024). These technologies are not merely enabling process improvements but are fundamentally reshaping how value is created, delivered, and captured, compelling companies to rethink their core operational and revenue strategies. For instance, digital transformation powered by AI and data analytics is opening new avenues for customer engagement and revenue generation across industries (Business Model Innovation Review, 2024). Companies that successfully integrate these emerging technologies into their business models are often better positioned to achieve a sustainable competitive advantage (Adewumi et al., 2024).

Conversely, failure to engage in strategic BMI, particularly in response to technological disruption, can lead to a significant decline in competitiveness. History offers examples of established companies that lost market leadership due to an inability to adapt their business models to new

paradigms, such as the challenges faced by traditional media in the age of digital streaming, or by brick-and-mortar retail with the rise of e-commerce. While the specific examples of Kodak or Nokia highlighted past industrial shifts (Gassmann et al., 2014), the underlying principle remains constant: static business models are vulnerable.

However, leveraging emerging technologies for BMI is not without its challenges. Obstacles such as high implementation costs, the need for new skill sets within the organization, and inherent organizational inertia can hinder adoption (Adewumi et al., 2024). Overcoming these barriers requires a strategic and proactive approach to BMI, recognizing it as a continuous process of re-evaluation and adaptation rather than a one-time fix. The ability to innovate the business model, therefore, is a critical determinant of long-term viability and success in an era of ongoing technological disruption (Adewumi et al., 2024; Business Model Innovation Review, 2024).

4.4.2 The Importance of Business Model Innovation

Empirical research has demonstrated that business model innovation often has a greater impact on profitability and long-term success than product or process innovation alone (Gassmann et al., 2014). For example, a study by the Boston Consulting Group (BCG) revealed that business model innovators are, on average, 6% more profitable than companies focused solely on product innovation. This is because business model innovation tends to involve more comprehensive changes, allowing companies to address multiple aspects of their operations simultaneously, from customer acquisition to value delivery and profit generation (Gassmann et al., 2014).

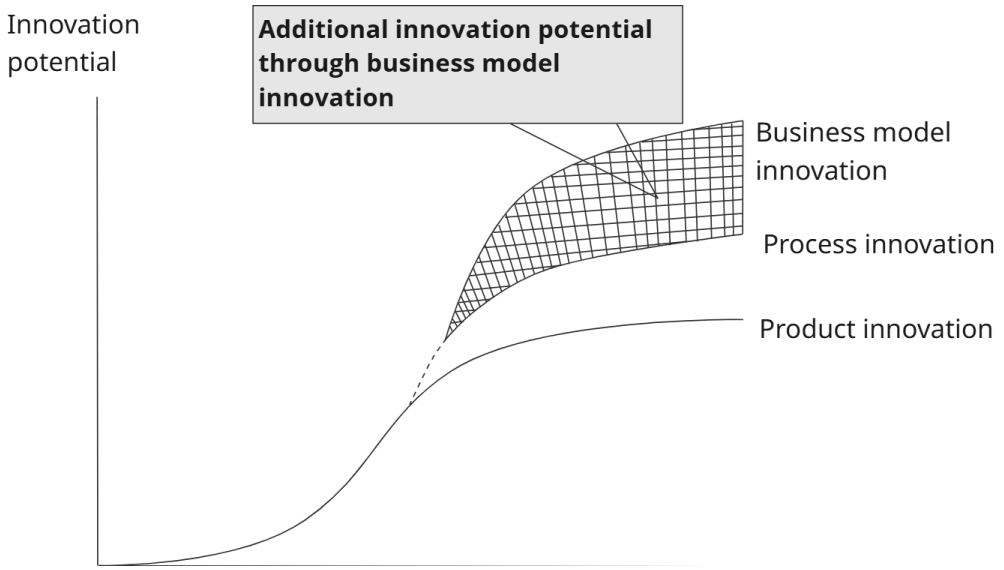


Figure 10: *New business models allow for additional innovation potential on top of product and process innovation (Author Figure based on Gassmann et al., (2014))*

The importance of business model innovation is further underscored by its potential to drive sustainability. Many companies that innovate their business models to align with sustainable practices report significant profitability increases. This highlights the broader relevance of business model innovation in addressing not only competitive pressures but also evolving environmental and social challenges (Gassmann et al., 2014).

The imperative for business model innovation is not isolated but is deeply connected to the success factors of Contech startups discussed in section 4.1.3, such as innovation and strategic adaptability.

4.4.3 Evolving Business Models in Technology Startups

Tech startups by their nature, operate in highly dynamic environments where the ability to innovate and adapt their business models is not merely advantageous but critical for survival and growth (Business Model Innovation Review, 2024). Unlike established corporations that may iterate on existing models, tech startups often need to develop agile and scalable business models from the outset to accommodate rapid growth trajectories and pivot effectively in response to evolving market demands and technological shifts (Business Model Innovation Review, 2024).

Common Business Models in Tech Startups
Tech startups frequently navigate a balance between novelty, introducing disruptive products, services, or value propositions, and efficiency, optimizing internal processes for cost-effectiveness and scalability (Balboni et al., 2019). While initial differentiation often comes from novelty, sustained growth necessitates a progressive focus on operational efficiency. Successfully integrating both exploration (novelty) and exploitation (efficiency), a concept known as contextual ambidexterity, is crucial for navigating the complexities of scaling (Balboni et al., 2019).

Several business model archetypes are prevalent within the tech startup ecosystem, often enabled or enhanced by digital technologies (Business Model Innovation Review, 2024):

- **Subscription Models:** Companies like Netflix and Spotify exemplify this model, where customers pay recurring fees for ongoing access to services or content. This model fosters predictable revenue streams and customer loyalty.
- **Freemium Models:** Common among Software as a Service (SaaS) companies such as Dropbox and Slack, this approach offers basic services free of charge while monetizing premium features, upgrades, or expanded capacity. It serves as a powerful customer acquisition tool.
- **Platform Models:** These models create value by facilitating interactions or transactions between two or more distinct user groups (e.g., buyers and sellers on an e-commerce platform, or service providers and users in the gig economy). The platform owner typically generates revenue through commissions, fees, or advertising.

Impact of Technological Advances on Business Models and Growth
The evolution of business models in tech startups is driven by external factors such as emerging technologies like AI, IoT, and big data analytics (Adewumi et al., 2024). These technologies enable startups to create new value propositions, personalize offerings, optimize operations, and access new markets in ways previously unimaginable. For ConTech startups specifically, leveraging such technologies within their business models can be a key differentiator.

Moreover, contextual ambidexterity, the ability to integrate both novelty and efficiency, has a profound impact on the growth of tech startups. Early-stage startups often emphasize novelty to disrupt traditional industries or introduce new solutions, but as they scale, integrating efficiency becomes critical to managing operations, optimizing costs, and enhancing profitability (Balboni et

al., 2019). Studies have shown that tech startups that effectively balance these two dimensions through business model innovation are more likely to achieve sustainable growth and outperform competitors who focus solely on one aspect (Gassmann et al., 2014).

4.5 Market Entry vs. Go-To-Market (GTM) Strategy

Successfully introducing a new product or service requires careful strategic planning, encompassing both the overarching Go-To-Market (GTM) strategy and the specific Market Entry strategy. While related and often used in conjunction, these terms address different facets and phases of the launch process (Gassmann et al., 2014; Peekage, 2024).

A Go-To-Market (GTM) strategy is a comprehensive, tactical action plan that outlines the entire lifecycle of how a company will engage with customers to sell its product or service effectively (Peekage, 2024). It is a blueprint for generating demand and driving sales, extending from initial market research and product positioning through to sales execution, customer onboarding, and post-launch performance assessment (LeanLabs, n.d.). A robust GTM strategy typically defines the target market and buyer personas, articulates a clear value proposition, selects appropriate marketing and sales strategies, determines pricing, and chooses optimal distribution channels (Peekage, 2024). Its importance lies in minimizing launch risks, aligning internal teams (marketing, sales, product), optimizing resource allocation, and creating a pathway for repeatable and scalable growth (Peekage, 2024).

Market Entry, in contrast, refers more specifically to the strategic decisions and actions involved in introducing a company’s products or services into a new geographical market or a new market segment (Markman et al., 2019). While market entry is a critical component of a GTM strategy, it often involves a deeper analysis of factors such as the competitive landscape of the specific new market, regulatory environments, cultural nuances, and the optimal mode of entry (e.g., direct export, joint venture, acquisition) (Zachary et al., 2015; Markman et al., 2019). Thus, market entry strategy can be seen as the set of choices that operationalize the launch into a particular market, forming a crucial phase within the broader GTM plan.

4.5.1 Go-to-Market (GTM) Strategy

A *Go-to-Market* (GTM) strategy is a crucial framework for organizations, particularly startups, as they aim to introduce their product or service into the market. A well-structured GTM strategy outlines how a company interacts with its target customers to sell its product or service effectively and gain a competitive advantage. This extends beyond the product launch and includes key aspects like positioning, sales, and customer engagement (Dangare & Pachpande, 2023).

The core components of a GTM strategy focus on defining product-market fit, identifying the target audience, understanding the competitive landscape, and selecting appropriate distribution channels (García-Gutiérrez & Borreguero, 2016). A GTM strategy is vital for aligning the organization's resources with market demands, ensuring that the product launch is successful and that the startup can generate revenue quickly and efficiently. For example, customer development, involving direct interviews and problem validation with potential users, is a foundational step in defining the target market and their specific pain points (LeanLabs, n.d.). A well-articulated GTM strategy is vital for

aligning organizational resources with market opportunities, thereby ensuring a successful product launch and enabling the startup to generate revenue efficiently (García-Gutiérrez & Borreguero, 2016).

Moreover, the development of an effective GTM strategy is interconnected with other strategic considerations. It must align with the startup's chosen business model (as discussed in section 4.4) and take into account the organizational structures and procurement processes of potential clients, particularly in B2B sectors like construction (see section 4.2).

Key elements typically addressed within a GTM strategy include:

- **Product-Market Fit (PMF):** This remains a cornerstone, determining how effectively the product addresses significant problems for a clearly defined target audience. Startups must validate that their solution resonates with potential customers by understanding their needs and pain points (Ashkenas, 2016).
- **Target Audience and Buyer Personas:** Beyond broad market identification, this involves a deep understanding of customer demographics, firmographics (for B2B), behaviors, motivations, and purchasing power, enabling tailored messaging and outreach (Kehbila, 2020; Peekage, 2024).
- **Competitive Analysis and Value Proposition:** A thorough analysis of direct and indirect competitors is necessary to identify differentiation opportunities and to clearly articulate the unique value the startup offers (Dangare & Pachpande, 2023; LeanLabs, n.d.). The value proposition must concisely communicate benefits over features.
- **Distribution Strategy:** This involves selecting the most effective and efficient channels to make the product accessible to the target audience, which could range from direct sales teams and online platforms to partnerships and reseller networks (Ashkenas, 2016; Peekage, 2024).

4.5.2 Market Entry

Market entry refers to the process of entering a new or adjacent market to offer products or services. This process is not a single event but a strategic decision that unfolds over time, involving extensive planning, resource allocation, and adaptation to a new environment. According to Markman et al. (2019), market entry involves answering key questions such as who are the players, where to enter, what to enter with, how to enter, and when to enter. These questions form a framework that helps firms address critical aspects of entry, such as competition, customer segmentation, resource utilization, and timing, which are essential for successful market penetration.

The *Who* of market entry refers to identifying key players such as competitors, customers, suppliers, and other potential entrants that might impact the firm's market entry (Zachary et al., 2015). Understanding these players is crucial to adapting a firm’s strategy to the dynamics of the new market and ensuring that competitive advantages can be leveraged effectively.

The *Where* in market entry relates to the specific geographical, product, or technological space a company chooses to enter. Firms must evaluate if the new market aligns with their capabilities and

resources. Entering a market where a firm already possesses technological or operational strengths can reduce the risks associated with new market entry (Markman et al., 2019).

What a company enters with, whether it's a product, service, or new business model, determines how it will position itself against incumbents. Companies need to ensure that their offering is distinct and addresses a clear market need. The role of complementing services or products can play a significant part in strengthening the firm's entry strategy by leveraging existing ecosystems and reducing entry costs (Aobdia et al., 2018).

The *How* of market entry involves determining the resources and capabilities necessary to succeed. Companies must ensure they have the right mix of skills, technologies, and operational capabilities to meet the demands of the new market. Additionally, firms may choose various entry modes such as joint ventures, partnerships, or direct entry depending on their resources and risk appetite (Zachary et al., 2015).

Finally, the When aspect involves determining the optimal timing of entry. Entering a market too early can expose a company to risks associated with untested demand, while entering too late may mean facing entrenched competitors. Timing is crucial for achieving a competitive advantage, whether through first-mover status or fast-follower strategies (Markman et al., 2019).

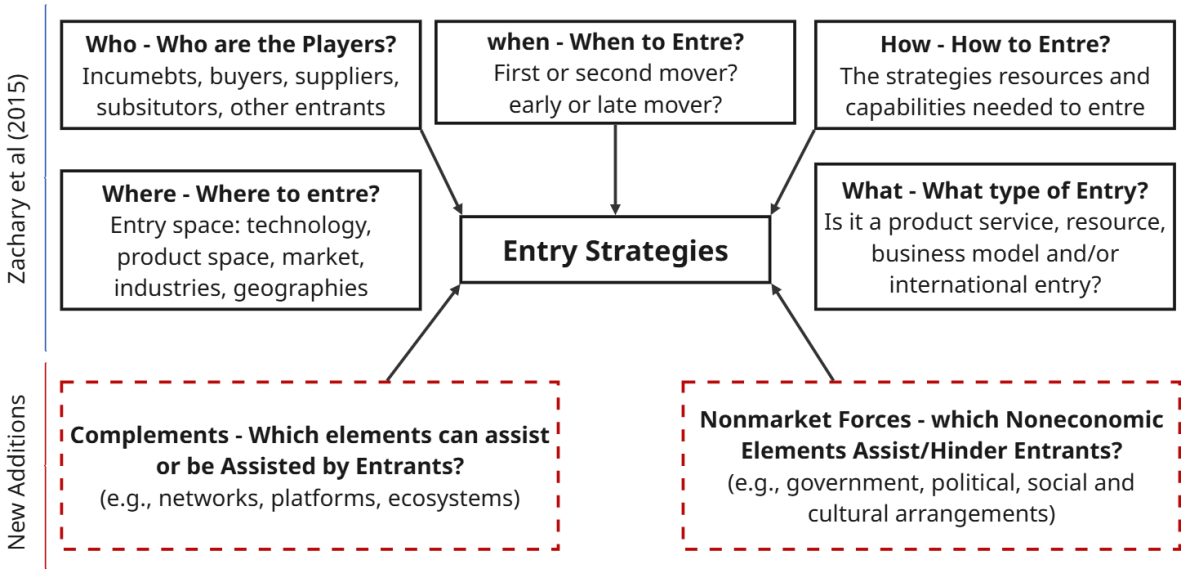


Figure 11: *The Forces that Shapes Market Entry Strategies (Author Figure based on Zachary et al.,(2015))*

4.5.3 Navigating Entry Challenges

Contech startups often face challenges during initial market entry, particularly with regulatory requirements, establishing credibility, and forming partnerships. The fragmentation of the construction industry, along with project-specific thinking and region-specific customs and requirements, complicates this process. Therefore, the key is to find solutions that are less limited by these boundary conditions and require minimal case-specific adaptation.

Aligning market entry steps with the broader GTM strategy involves ensuring that the startup's offerings are adaptable to various market conditions without extensive customization. This alignment helps in reducing barriers to entry and accelerates the adoption of the product or service across different regions and projects.

4.5.4 Crossing the Chasm

The concept of "Crossing the Chasm" was introduced by Geoffrey Moore (2002) as an extension of the Diffusion of Innovations (DOI) theory by Everett Rogers. It addresses the significant gap between early adopters and the early majority in the adoption cycle of disruptive innovations, a critical barrier that must be overcome for new technologies or innovations to achieve mainstream success.

Successfully crossing the chasm is a key challenge for startups, particularly those introducing disruptive innovations. Early adopters, often tech enthusiasts, are willing to take risks on new technologies, but the early majority is more pragmatic and requires proof that the product delivers reliable value (Ho, 2022). As Moore (2002) notes, many innovations fail to cross this chasm, remaining stuck in niche markets.

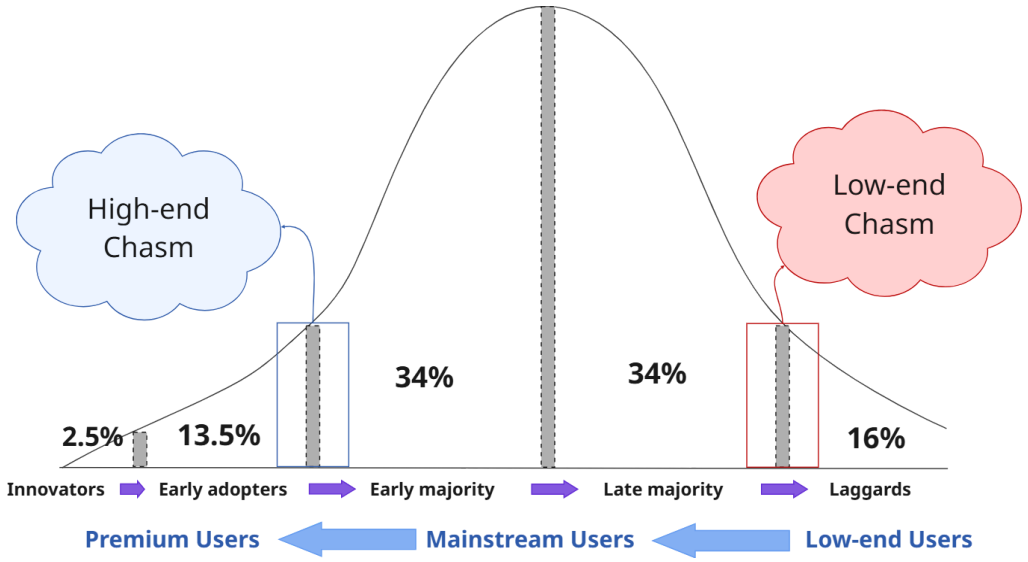


Figure 12: *Two directions of innovation adoption (Author Figure based on Geoffrey Moore.,(2002))*

4.6 Innovation and Scalability

4.6.1 Innovation vs. Invention

Innovation and invention are often used interchangeably, but they are distinct concepts with unique roles in development and industry growth. *Invention* refers to the creation of a new product, process, or concept that has not previously existed. This often involves scientific or technical breakthroughs, resulting in something tangible, such as a device or system created after extensive research (Merriam-Webster, 2024). In contrast, *innovation* builds on existing products, ideas, or technologies to introduce improvements or adaptations. Rather than inventing from scratch, innovation redefines how something is used or applied, often making it more accessible or efficient.

4.6.2 Innovation and Scalability

While innovation introduces new solutions, scalability determines the extent to which these solutions can impact the industry. For an innovation to achieve widespread influence, it must transition from a conceptual solution to a fully integrated component within a broader market. This process, *scaling*, often poses challenges as it requires adapting the innovation for broader audiences while maintaining its core benefits. According to Nieminen (2021), the lifecycle of an innovation begins with idea generation and validation, but its success largely depends on the ability to scale.

Moreover, the ability to scale innovation is essential for Contech startups. Scalability challenges arise from the construction industry's complexity, project-based nature, and slower adoption of technology. Each construction project is often unique, making it difficult to standardize solutions and scale them across different projects.

4.6.3 Scaling Up, Out, and Deep

Nieminen (2021) identifies three primary pathways for scaling: scaling up, scaling out, and scaling deep. "Scaling up" focuses on the operational aspects, ensuring the innovation can be produced at a volume and price point that sustains market demands. This requires efficient production processes and a robust supply chain that meets quality and cost requirements. For instance, companies like Tesla achieve scale by not only manufacturing at high volumes but also vertically integrating supply chains to maintain control over quality and reduce costs.

"Scaling out," on the other hand, emphasizes geographic or demographic expansion to increase the innovation's reach. By adapting the product for different markets, companies can tap into a wider audience, tailoring features to meet the needs of new user bases. This approach is illustrated by companies like Amazon, which used its e-commerce infrastructure to create Amazon Web Services, thereby scaling its innovation in a new sector.

Finally, "scaling deep" aims to maximize the utility of the innovation within existing user groups by promoting repeated or intensified use. An example can be seen in cloud computing, where the same infrastructure serves multiple users and purposes, maximizing the utilization of resources. This dimension often involves changing user behaviors to enhance engagement, such as social media algorithms designed to keep users on the platform longer, thereby increasing engagement without necessarily expanding the user base.

4.6.4 Sustainable Innovation and Scalability

Nogueira et al. (2022) add a critical dimension to the scalability discussion by exploring how sustainability-driven innovations can be scaled within social and environmental contexts. Through the lens of Intentional Sustainable Communities (ISCs), they examine how grassroots innovations contribute to Sustainable Development Goals (SDGs). In this model, scaling up or out involves networks and community relationships, which facilitate knowledge transfer and increase the innovation’s impact.

The challenge of scaling sustainable practices lies in overcoming institutional and regulatory hurdles while maintaining the innovation's core values. This requires a multi-level approach where networks support diffusion and adaptations while retaining the principles of the original innovation (Nogueira et al., 2022). This aligns with the broader concept that effective scalability involves the capacity to replicate innovation in a way that respects its original intent while meeting new contexts' demands.

4.6.5 Effective Strategies for Market Adoption

Effective market adoption strategies are not developed in isolation but are linked to comprehensive Go-To-Market (GTM) strategies (as discussed in section 4.4) and a startup's capacity for innovation and scaling. For Contech startups aiming to transition from early adopters to mainstream market acceptance, several strategies are proving crucial in the current technological landscape. A primary focus must be on user experience (UX); solutions that are intuitive, easy to integrate into existing construction workflows, and require minimal specialized training are more likely to gain traction (SiteLink AI, 2024). Furthermore, demonstrating a rapid time-to-value is essential; Contech solutions should offer quick onboarding and an immediate, demonstrable value proposition to align with the time-sensitive nature of construction projects (SiteLink AI, 2024).

Many successful Contech offerings are adopting process-enabled Software as a Service (SaaS) models, which facilitate scalability, easier updates, and integration with existing project management systems (SiteLink AI, 2024). Beyond the technology itself, effective market adoption also involves building credibility through strong references, case studies, and ensuring that offerings genuinely address validated market needs and streamline complex processes (SimplyFleet, 2024). Continuous workforce training and creating opportunities for experimentation with new tools can also lower adoption barriers (SimplyFleet, 2024), although challenges such as initial investment costs and skill gaps for complex systems like Building Information Modeling (BIM) persist (RPC General Contractor, 2024).

4.6.6 Stakeholder Buy-In for Innovation

Stakeholder support is critical in scaling Contech innovations, particularly in an industry where clients and other key players may prioritize immediate project demands and established financial metrics over embracing new technologies. Achieving buy-in is a proactive process that involves more than just presenting a technologically superior solution; it requires a strategic approach to engagement (Mural.co, 2025). This typically includes identifying all key stakeholders, thoroughly understanding their specific interests, concerns, and expectations through direct dialogue (e.g., interviews or surveys), and clearly communicating the vision and tangible benefits of the innovation in a language that resonates with their priorities (Mural.co, 2025). For instance, framing innovation in terms of improved cost estimation, enhanced collaboration, or risk mitigation can be effective (Conwize.io, 2024).

Educating stakeholders about these benefits and transparently addressing potential resistance or concerns are key to overcoming the construction industry's inherent complexities and human factors, such as reluctance to adopt unfamiliar systems (Mural.co, 2025). Building strong relationships, demonstrating progress, and showcasing social proof or successful pilot projects can

further solidify support (Mural.co, 2025). Ultimately, fostering an environment where innovation is understood and valued by all stakeholders is essential for the growth and impact of Contech startups. The unique challenges of the construction industry, such as project complexity and stakeholder resistance, necessitate these strategic approaches to scaling innovations, thereby enhancing their potential for widespread adoption and industry transformation.

5. Empirical Material and Interviews

This section presents the empirical findings from interviews conducted with industry experts in the construction technology (Contech) sector. The insights gathered provide practical perspectives that complement the theoretical frameworks discussed in the previous chapter. By structuring this section with the same headings as the Theory and Literature section, a clear connection is established between theoretical concepts and real-world experiences.

5.1 What is a Construction Tech Startup (Contech Startup)

5.1.1 Definition of a Contech Startup

Industry experts highlight that Contech startups are fundamentally about innovation and problem-solving within the construction industry. Business Developer 1 defines innovation in Contech as creating new and novel solutions that address problems current practices cannot solve. He states, "Innovation has to be new and novel, something that hasn't been done in the same way before. I think it's about problem-solving, addressing something we can't currently do" (Business Developer 1, 2024). This emphasizes that Contech startups focus on introducing innovations that enhance efficiency, safety, and cost-effectiveness in construction processes.

5.1.2 Types of Contech Startups

While the interviews did not explicitly categorize types of Contech startups, they underscored the diversity of innovations within the sector. Startups may focus on digitizing construction processes, developing new materials, or integrating technologies like AI and IoT to improve project outcomes.

5.1.3 Characteristics of Successful Tech Startups

Innovation Supporting Daily Work

According to Angel Investor 2, successful Contech startups create impactful innovations that support people in their day-to-day work. He cites Dalux as an example, a startup that digitized drawings from paper to PDFs, directly solving a practical problem and becoming an indispensable tool used in many countries.

Team Composition and Industry Knowledge

A crucial factor for success is having a team with a deep understanding of the construction industry. Angel Investor 2 emphasizes that teams need to comprehend the business, be innovative, and think differently about current workflows. He notes, "Developing good products in close collaboration with customers is essential. To transition from product development to the customer effectively, having people in sales and customer success roles with industry experience is crucial. It builds trust, which is vital" (Angel Investor 2, 2024).

Similarly, CEO 2 highlights the importance of a balanced team. He states, "A person who knows the technology is necessary for the development of the product/service. However, that alone is not

enough to bring the technology to market. For that, you need a sales-minded person who might also be capable of acquiring financing".

Commitment and Entrepreneurial Attitude

CEO 2 stresses that all team members must possess a strong entrepreneurial attitude. "People who are just there to work and make nice money are not suitable for a startup environment. With growth, it is worth looking at whether the founders are the right people to professionally manage a company that has already grown bigger".

Understanding Industry Dynamics

The project-based nature of the construction industry poses unique challenges. CEO 2 notes that the industry thinks on a project-by-project basis rather than as a continuous process, which complicates market research and MVP development. Startups must navigate this mindset to effectively position their solutions.

Customer Relationships and Feedback

Maintaining close client relationships is pivotal. CEO 2 advises that "sales and customer relationship management play a central role in reaching customers and maintaining customer relations. Keeping and redeeming promises is required to create a bond". Building trust through reliable delivery and making the customer's life easier fosters strong, lasting relationships.

5.2 Centralized vs. Decentralized: How Contech Startups Address Industry Challenges

5.2.1 Centralized Approaches

CEO 2 observes that within startups, a centralized organizational model works best initially. "In the beginning, a centralized organization works best, which is a natural option when the operation is still quite small" (CEO 2, 2024). This structure ensures that everyone works cohesively toward common objectives, which is crucial during the early stages of a startup.

Regarding client organizations, CEO 2 notes that centralized firms may be more challenging for startups to penetrate due to established processes and hierarchies. However, when regulatory drivers or compliance requirements are involved, centralized solutions can gain quick adoption due to mandated compliance.

5.2.2 Decentralized Approaches

Conversely, the construction industry largely operates in a decentralized and distributed manner. Angel Investor 2 explains, "The structure is largely decentralized and distributed, operating as a network between people and projects. Even within large companies, a decentralized approach works better" (Angel Investor 2, 2024). This decentralization means that decision-making often occurs at the project level, providing startups with opportunities to engage directly with project managers.

Management Consultant 1 adds that targeting individual project managers is essential in decentralized organizations, as they hold decision-making authority. "For decentralized companies, targeting individual project managers is essential, as they hold decision-making authority" (Management Consultant 1, 2024).

5.2.3 Adaptability and Product Customization

Successful startups tailor their solutions to meet the specific needs of both centralized and decentralized companies. CEO 2 emphasizes the importance of recognizing the project-oriented operating model and suggests that handling this model effectively is more crucial than focusing solely on the organization's structure.

Angel Investor 2 underscores the need for customer-centric development, stating, "Developing good products in close collaboration with customers is essential. By working directly with those who will use the technology, often at the project level, startups can create solutions that address real-world challenges and are more readily adopted" (Angel Investor 2, 2024).

5.2.4 Addressing Industry Challenges

Both centralized and decentralized firms tackle issues like labor shortages and cost overruns differently. CEO 2 believes that startups should maintain a centralized internal structure to effectively leverage their collective resources when addressing industry challenges.

On the other hand, Angel Investor 2 points out that decentralized structures offer favorable entry points for new Contech solutions. "By engaging with individuals open to change at the project level, startups can implement their technologies more rapidly and demonstrate their value" (Angel Investor 2, 2024). This approach can lead to broader adoption as successful implementations encourage wider acceptance within larger organizations.

5.3 Financing and Funding

5.3.1 Types of Startup Funding

Early Funding Choices and Challenges

Founders' personal investment is critical in the early stages. CEO 2 advises, "At the very beginning, the founders must make a significant investment into the company. Otherwise, it will be difficult to get financing in later stages if it is found that the founders are not sufficiently financially committed" (CEO 2, 2024).

Different financing models can impact future funding opportunities. "If, for example, you end up using crowdfunding, it might limit private capital investors. You should familiarize yourself with the pitches of other companies to see how key issues are summarized" (CEO 2, 2024).

Management Consultant 1 emphasizes minimizing external funding until the business case is validated. "We aim to keep the startup phase as short as possible by securing a first client to fund further development through revenues" (Management Consultant 1, 2024).

5.3.4 Balancing Growth and Control

As startups scale, balancing growth with control becomes paramount. CEO 2 recommends subordinated loans over traditional debt capital. "A subordinated (capital) loan is a better option than debt capital from the point of view of a growing company... you don't have to give up such large shares in your company" (CEO 2, 2024).

This approach allows startups to access necessary capital while maintaining greater control over their company, providing a solid foundation for growth.

5.3.5 Current Investment Trends and Future Goals

CEO 2 notes challenges in securing funding within the construction industry. "Currently, startups have challenges finding financiers... To the extent that funding is available, it is largely focused on digital because under suitable conditions it is seen to have the best possibilities for growth" (CEO 2, 2024).

The inclusion of AI is increasingly expected by investors. "If AI isn't part of the solution right now, it might drive away investors. The use of AI as part of the solution is an indication that the solution is in the spirit of the times" (CEO 2, 2024).

5.4 Business Models and the Importance of Innovation

5.4.1 Preferred Business Models and Adaptation

CEO 2 identifies subscription and platform models as effective in Contech. "Subscription with an annual or monthly fee and a possible opening fee is a good option, but in terms of scaling, the platform may work better" (CEO 2, 2024).

Management Consultant 1 echoes this, noting the appeal of platform-based solutions offering subscription or pay-per-use options. "These models appeal to clients by reducing upfront risk, allowing them to try the solution without long-term commitments" (Management Consultant 1, 2024).

5.4.2 Role of Innovation in Business Model Evolution

Innovative business models are crucial for maintaining a competitive edge. CEO 2 shares an example: "In one startup I have been involved in, the matter has been resolved... by making the product into a platform to be sold by others and filled with their own content, while still keeping the brand visible on the platform" (CEO 2, 2024). This strategy allowed for significant growth without extensive sales efforts.

5.4.3 Impact of Technological Advances on Business Models

Technological advancements like AI and IoT have influenced business models in Contech. CEO 2 observes, "IoT is part of everyday life and no longer emphasized... AI should be part of the

solution" (CEO 2, 2024). Incorporating AI aligns with investor expectations and can enhance a startup's appeal.

5.5 Market Entry vs. Go-To-Market (GTM) Strategies

5.5.1 Market Entry and GTM Alignment

Identifying the right market is critical. CEO 2 states, "Normally the gaps in the market... Some gaps they think they can fill better. Regional needs do not create an opportunity for scaling and do not attract investors" (CEO 2, 2024).

Management Consultant 1 highlights the importance of aligning market entry with GTM strategies by building relationships. "Building strong relationships with stakeholders is essential, as the industry's risk-averse nature makes it difficult to introduce unproven solutions" (Management Consultant 1, 2024).

5.5.3 Navigating Entry Challenges

Gaining credibility is challenging due to industry fragmentation. CEO 2 notes, "It is challenging to gain sufficient credibility... The key is to find a solution that is less limited by these boundary conditions and requires limited amount of case-specific tuning" (CEO 2, 2024).

Management Consultant 1 adds that external drivers like legislation can facilitate entry. "Companies are more open to adopting new solutions when driven by external forces, such as new legislation, a banned method, or an urgent problem that must be addressed" (Management Consultant 1, 2024).

5.5.4 Crossing the Chasm in Contech

Transitioning from early adopters to the mainstream market requires strategic effort. CEO 2 observes, "Often, those who come in second are the winners. Early adapters have had to bear the heaviest burden... In the construction industry, it depends a lot on references" (CEO 2, 2024). Building credibility through significant references is essential for broader market acceptance.

5.6 Innovation and Scalability

5.6.1 Innovation vs. Invention

Business Developer 1 differentiates between innovation and invention, emphasizing that innovation involves problem-solving and creating new methods, while the resulting product is the invention. "When it comes to invention... you needed innovation to develop the new materials and assembly methods, but the wall itself is the invention" (Business Developer 1, 2024).

5.6.2 Innovation and Scalability

Scalability challenges arise from the industry's complexity. Business Developer 1 explains, "Construction isn't fully industrialized, and every building project is essentially a prototype... making it difficult to standardize solutions" (Business Developer 1, 2024). This makes scaling innovations across different projects a significant hurdle.

5.6.5 Effective Strategies for Market Adoption

Founders who focus on long-term impact can drive significant innovation. Business Developer 1 notes, "When a startup develops a strong solution, it often gets acquired quickly by a larger company... It's rare to find founders who want to stay independent and make a long-term impact on the industry" (Business Developer 1, 2024). Remaining independent can allow startups to continue innovating without restrictions.

5.6.6 Stakeholder Buy-In for Innovation

Stakeholder support is critical but often lacking. Business Developer 1 points out, "Stakeholders, particularly clients, don't always have a deep understanding of the innovations available or their potential benefits... This gap between what's possible and what clients prioritize often leads to inefficiencies and lower project quality" (Business Developer 1, 2024). Educating stakeholders and demonstrating tangible benefits is essential for gaining support.

5.7 Alternative Approaches to Starting a ConTech Startup

In addition to the previous expert interviews, two additional perspectives were gathered from industry professionals: CEO 1, founder of Alga Insulation, and Angel Investor 1, an experienced entrepreneur and ConTech expert. These two interviews provide contrasting approaches to startup formation, validation, and scaling in the ConTech sector.

The selection of these two professionals was deliberate. CEO 1, represents a first-time founder in the early stages of her startup. In contrast, Angel Investor 1, is a seasoned CEO and serial investor. This provides a unique opportunity to view the founder's journey from both its beginning and its more advanced stages.

5.7.1 CEO 1's Approach: Research-Driven Startup Formation

CEO 1's journey with Alga Insulation highlights a structured and research-intensive approach to launching a ConTech startup. Her startup journey follows a linear progression, emphasizing research, validation, and strategic partnerships.

- **Problem Identification and Market Research**
    - The idea emerged from an entrepreneurship event focused on the UN Global Goals and sustainability challenges in marine resources.
    - Extensive industry research revealed a gap in sustainable insulation materials, leading to the exploration of seaweed-based insulation.
    - Engagement with construction firms, policymakers, and researchers validated market demand for eco-friendly solutions.
- **Defining the Business Model and Competitive Landscape**
    - Market research confirmed a $63 billion industry with a projected $100 billion growth by 2030.
    - Early client validation came from four major construction companies agreeing to test the product.

    - A patent application was filed to protect the innovation.
- **Team Formation and Financial Planning**
    - The team-building process focused on research partnerships and industry advisors rather than hiring a full-fledged operational team immediately.
    - Instead of seeking early investment, the startup relied on government grants, competitions, and sustainability-focused funding to secure capital without dilution.
- **Legalization and Branding**
    - The company was registered early to gain credibility and access funding, but public branding efforts were initially limited to prevent premature exposure of the idea.
    - As the company became more established, branding efforts expanded through conferences, networking, and digital presence.
- **Investment Strategy and Scaling**
    - The startup is currently pre-revenue, awaiting certifications and regulatory approvals before commercialization.
    - Investment discussions are ongoing, with an intention to raise capital before actually needing funds to secure strategic investor alignment.

5.7.2 Angel Investor 1's Approach: Iterative and Adaptive Validation

Angel Investor 1 offers a more flexible, network-driven approach, emphasizing rapid iteration, expert validation, and adaptability.

- **Idea Generation and Validation**
    - Ideas originate from industry contacts, internal company discussions, and personal experience.
    - Validation happens through trusted networks rather than structured research frameworks.
    - Timing is critical: even a great idea can fail if the market isn't ready.
- **Financial Planning and Viability**
    - Budgeting happens early, but with minimal detail, refined progressively as more information becomes available.
    - The first budget is expected to be inaccurate, improving with iteration.
- **Legal Setup and Team Formation**
    - Legal structuring should be addressed early to prevent costly mistakes.
    - A strong founding team is more important than having a "perfect" business idea.
    - Trust and teamwork matter more than individual technical skills.
- **Branding and Product Development**
    - Branding is not an immediate priority, credibility with key customers matters more than public visibility.
    - Product development should follow a fail-fast, iterate-fast approach, engaging customers before building a full-fledged product.

5.7.3 Comparative Analysis: Structuring the Framework for Startup Formation

The two perspectives offer complementary approaches to starting a ConTech startup, which together help refine a structured framework for startup formation:

Table 4: *Summary of the Comparative Analysis between CEO 1's and Angel Investor 1's Approaches.*

Step	CEO 1's Structured Approach	Angel Investor 1's Iterative Approach
1. Problem Identification & Market Research	Extensive research, stakeholder engagement, and validation	Idea validation through expert networks and industry discussions
2. Business Model Development & Competitive Analysis	Defined early, aligned with sustainability trends, filed a patent	Evaluated iteratively, focusing on scalability and adaptability
3. Team Formation	Built gradually through research partnerships and advisory board	Team matters more than the idea, strong co-founder dynamics prioritized
4. Financial Planning & Funding	Relies on grants and competitions to delay external investment	Budgeting evolves over time, minimizing early costs
5. Legalization & Structure	Registered early to attract grants and industry credibility	Established early to prevent legal hurdles later
6. Branding & Digital Presence	Started later to avoid premature exposure	Early credibility with key customers is more important than public branding
7. Product Development & MVP	Research-driven, aligned with certification requirements	Fail-fast, iterate-fast, early engagement with customers
8. Investment & Scaling	Strategic investment before actually needing funds	Focus on execution ability and scalability before seeking funding

Jana's structured validation and research-driven growth approach is particularly well-suited to startups operating in highly regulated environments, developing deep-tech solutions, or managing significant intellectual property. By emphasizing rigorous market and regulatory analysis, systematic hypothesis testing, and thorough documentation, this method ensures robust validation and builds credibility with stakeholders before any significant scaling effort.

In contrast, Fredrik's iterative and network-based validation model excels in fast-moving markets where customer-driven product evolution and rapid iteration are paramount. Leveraging early adopter networks for continuous feedback and prioritizing quick Build–Measure–Learn cycles over extensive upfront research fosters adaptability and speed to market. Together, these complementary strategies, one anchored in comprehensive research and the other in agile iteration, form the foundation of the ConTech startup framework presented later in the paper.

6. Analysis of Existing Startup Methodologies

6.1 Evaluating the Lean Startup Methodology

6.1.1 Overview of the Lean Startup Approach

The Lean Startup methodology, developed by Eric Ries (2011), in his seminal work, The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses, offers a systematic approach to developing businesses and products under conditions of extreme uncertainty. It shifts the focus from elaborate upfront planning and rigid execution to a process centered on validated learning, iterative development, and rapid experimentation (Ries, 2011). The core tenet is to minimize wasted effort and resources by continuously testing assumptions and adapting to customer feedback.

At the heart of the Lean Startup philosophy lies the concept of validated learning, the idea that true progress for a startup comes from discovering what creates value for customers, rather than merely delivering features. Startups begin with a vision, a core belief about the change they want to make in the world, which then guides their strategy (business model, product roadmap, and assumptions) and informs the product (DeVries, 2023; Ries, 2011).

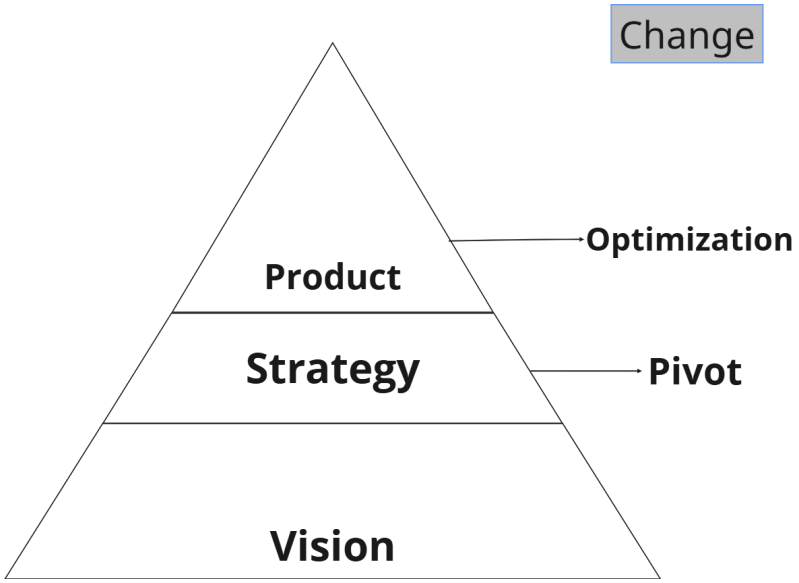


Figure 13: *The core elements of chang (Author Figure based on DeVries.,(2023))*

A key principle of the methodology is the Minimum Viable Product (MVP): the simplest version of a product that enables one full iteration through the Build-Measure-Learn loop. Rather than building a perfect product, startups should develop MVPs that allow them to test hypotheses about customer behavior, including the value hypothesis (whether the product delivers real value) and the growth hypothesis (how new customers will discover the product) (DeVries, 2023; Ries, 2011).

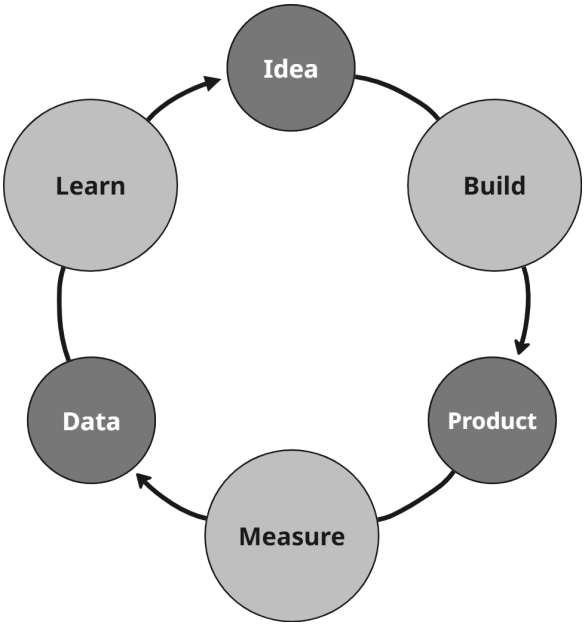


Figure 14: *The Build, Measure, Learn loop (Author Figure based on DeVries.,(2023))*

The Lean Startup also introduces the concept of the pivot, a fundamental change in strategy based on what the startup has learned. By recognizing early when an approach isn't working, entrepreneurs can shift direction without starting from scratch. This pivoting ability, along with constant measurement using actionable, accessible, and auditable metrics, helps ensure that a startup can adapt and survive in uncertain environments (DeVries, 2023; Ries, 2011).

The Lean Startup framework was significantly influenced by earlier concepts, notably Steve Blank's Customer Development methodology (Blank & Dorf, 2012). Blank's work emphasized the importance of "getting out of the building" to directly engage with potential customers and validate assumptions about their problems and needs before committing significant resources to product development. This customer-centric approach is a foundational element echoed throughout Lean Startup principles (Blank & Dorf, 2012; Ries, 2011).

Furthermore, the methodology identifies three engines of growth, sticky, viral, and paid, that startups can leverage to achieve sustainable scaling. Lean Startup's emphasis on experimentation, customer-centric design, and systematic innovation has made it a foundational tool for modern entrepreneurs, offering a dynamic framework rather than a rigid set of instructions (DeVries, 2023; Ries, 2011).

6.1.2 Comparison to Real-World Cases

This section compares the core steps of the Lean Startup methodology with the actual processes followed by two ConTech founders: CEO 1 and Angel Investor 1. By mapping their actions against the Lean Startup model, we can observe which steps were adopted, skipped, or adapted , highlighting how the framework translates into practice for startups in the construction technology sector.

Table 5: *Summary of the comparison between the core steps of the Lean Startup methodology with the actual processes followed by CEO 1 and Angel Investor 1.*

Lean Startup Step	CEO 1	Angel Investor 1
Start with Vision	Followed – focused on sustainability and circular economy via algae insulation.	Followed – evaluates ideas aligned with long-term change and strategic outcomes.
Formulate Strategy	Followed – developed a business model, identified partners, and targeted market.	Followed – evaluates strategy per idea with focus on timing and feasibility.
Define Value Hypothesis	Followed – validated market need through stakeholder engagement.	Followed – confirms demand through expert discussions and early client feedback.
Define Growth Hypothesis	Partially Followed – has initial buyers lined up, but no structured growth model yet.	Partially Followed – focuses on securing first clients but no formal growth hypothesis.
Build Minimum Viable Product (MVP)	Skipped – product still in research phase, pending certifications.	Followed – builds early MVPs to test and iterate quickly.
Enter Build-Measure-Learn Feedback Loop	Partially Followed – feedback is being gathered, but no MVP to measure against.	Followed – relies heavily on iterative testing and fast feedback cycles.
Run Experiments to Test Assumptions	Followed – validating assumptions via testing with early adopters and stakeholders.	Followed – validates assumptions through conversations and simplified prototypes.
Measure with Actionable Metrics	Skipped – no product in market yet to measure traction or learning.	Partially Followed – measures qualitative feedback and customer traction.
Learn and Decide to Pivot or Persevere	Skipped – no clear point of pivot or decision yet due to early stage.	Followed – adapts strategy quickly based on validation or lack of traction.

6.1.3 Analysis & Gaps in Lean Startup for ConTech

While the Lean Startup methodology has significantly shaped how tech ventures approach product development and market entry, it exhibits several critical limitations when applied to ConTech startups. Most notably, it places a strong emphasis on rapid product iterations and technical innovation, often sidelining essential business-building components required for success in a complex, regulated, and conservative industry like construction.

One of the core critiques is that Lean Startup is heavily product-focused, with its Build-Measure-Learn loop geared toward product-market fit through fast experimentation.

However, ConTech startups often cannot afford this level of speed due to regulatory constraints, certification requirements, and long sales cycles. As seen in the case of *Alga Insulation*, CEO 1's approach had to prioritize stakeholder engagement, regulatory understanding, and IP protection early on, elements that receive minimal attention in the Lean Startup framework.

Additionally, the Lean Startup methodology assumes a level of technical capability in the founding team that is not always present. Many ConTech founders come from industry backgrounds rather than software development. As Angel Investor 1 emphasized, team composition, industry trust, and iterative business feasibility are often more impactful than just product development alone.

The following table highlights the gaps in Lean Startup when evaluated against the actual needs and steps followed by our two case study founders:

Table 6: *Summary of the gaps in Lean Startup when evaluated against the actual needs and steps followed by the two case study founders.*

Startup Step	**Included in Lean Startup?**	**Notes / Missing Elements in Lean Startup**
Problem Identification & Market Research	Yes, implicitly	Mentioned in value hypothesis but not systematically structured as a step.
Business Model Development & Competitor Analysis	partially	Discussed under strategy but lacks emphasis on detailed modeling or legal IP.
Team Formation	No	Not explicitly addressed. Assumes founders have full capabilities from the start.
Financial Planning & Funding	briefly	Lean mentions resource efficiency but lacks practical financial planning tools.
Legalization & Company Structure	No	No mention of legal setup, company form, or regulatory alignment.
Branding & Digital Presence	No	Overlooked. Lean assumes product-focused validation without communication plans.
Product Development & MVP	yes	Core focus of Lean; detailed and well-articulated.
Investment & Scaling	Yes, however it's lightly mentioned	Growth engines discussed, but investment readiness and investor targeting absent.

In the context of ConTech startups, the omission of critical areas such as legal structure, certification requirements, funding strategy, and branding can hinder the ability of a founder to build a scalable and compliant business. Lean Startup is, therefore, best treated as a complementary tool within a broader startup formation framework rather than a standalone blueprint, particularly in

industries like construction where physical product development, B2B sales, and compliance are dominant factors.

6.2 Evaluating The Startup Owner's Manual

6.2.1 Overview of The Startup Owner's Manual

The Startup Owner's Manual, authored by Steve Blank and Bob Dorf, presents a comprehensive step-by-step guide aimed at helping entrepreneurs navigate the complexities of building a successful startup through a structured process of customer development. Drawing from years of practical experience, the authors reject the traditional product-launch model, one built on static business plans and fixed timelines, in favor of a more agile, hypothesis-driven method that focuses on learning directly from customers before scaling the business. Central to this methodology is the idea that startups must iterate rapidly, test assumptions early, and base strategic decisions on customer feedback, not internal conviction or conventional rollout strategies (Stringfellow, 2017).

The framework introduced in The Startup Owner's Manual unfolds across four key stages: Customer Discovery, Customer Validation, Customer Creation, and Company Building. The first stage, Customer Discovery, is designed to help founders understand the real problems their target customers face, challenging them to "get out of the building" and engage directly with users. Founders are encouraged to form and test various business model hypotheses, including value proposition, customer segments, revenue models, and sales channels. At this stage, a Minimum Viable Product (MVP) plays a crucial role in testing early assumptions and identifying whether the problem being solved is important enough for customers to adopt a new solution. This phase requires ongoing revision of the business model based on feedback and learning.

Following discovery, the Customer Validation stage focuses on proving that the business model is repeatable and scalable. Founders engage in real sales efforts, often manually and at a small scale, to ensure early adopters are not just interested, but are willing to pay. These efforts must remain low-cost and experimental in nature. The objective is to gather data from early customers to refine the product, positioning, and messaging. The manual outlines a clear expectation that if results do not validate core assumptions, founders should be prepared to pivot or adjust their approach rather than continuing with flawed premises.

The third stage, Customer Creation, shifts attention to demand generation and marketing. Once a repeatable sales process has been proven, startups can begin to invest in scalable customer acquisition strategies appropriate for their market type, whether entering a new market, serving an existing one, or re-segmenting a current one. Finally, the Company Building stage transitions the startup from a fluid, learning-oriented team to a structured organization with formal departments, roles, and growth mechanisms. Here, founders begin delegating responsibilities and building the operational backbone required to support long-term scaling.

Throughout the methodology, the Business Model Canvas, originally developed by Osterwalder, is used as a dynamic planning tool to visually map, test, and revise all key aspects of the startup. The manual promotes continuous learning through metrics and experiments, discouraging premature scaling and encouraging a "pivot or proceed" mindset at each critical milestone. Importantly, the

book adapts its guidance based on the type of product being built, offering dual tracks for physical versus digital products, and emphasizes that founders must remain personally involved in sales and customer interaction during the early phases. Ultimately, The Startup Owner's Manual serves as both a detailed blueprint and a mindset shift, pushing entrepreneurs to build companies through evidence-based learning and relentless customer focus rather than assumption-based execution (Stringfellow, 2017).

Table 7: *Overview of The Startup Owner's Manual phases and steps.*

Phase	**Step**	**Description**
Customer Discovery	Develop Hypotheses	Formulate key assumptions about the business model, including value proposition, customer segments, channels, revenue streams, and resources.
	Test Customer Problems	Engage with potential users outside the building to validate whether the identified problem is real, urgent, and widespread.
	Create a Low-Fidelity MVP	Develop a minimal version of the product to test the value proposition with early adopters (earlyvangelists).
	Test the Solution	Present the proposed solution and gather qualitative and quantitative feedback from customers.
	Update the Business Model	Incorporate learnings into the business model; pivot if necessary.
	Verify Business Model	Assess whether product-market fit exists, if customer acquisition is feasible, and whether the business model is financially viable.
Customer Validation	Phase I – Prepare to Sell	Refine messaging, build sales materials, and finalize a high-fidelity MVP. Develop roadmaps for sales and channels.
	Phase II – Try to Sell	Attempt to sell the product to early customers. Collect data on pricing, value perception, and purchasing behavior.
	Phase III – Position the Company	Align brand positioning with market expectations. Meet with industry influencers to test credibility.
	Phase IV – Pivot or Proceed	Review metrics, validate or revise strategy, and decide whether to continue scaling or return to previous steps for refinement.
Customer Creation	Marketing & Demand Generation	Execute strategies to acquire, retain, and grow the customer base. Focus on measurable, cost-effective marketing approaches tailored to specific customer segments and product type.

Company Building	Scaling the Organization	Transition from a startup to a structured company. Implement formal processes, expand the team, and establish scalable systems aligned with a validated business model.

6.2.2 Comparison to Real-World Cases

The *Startup Owner's Manual* outlines a detailed, step-by-step methodology for building startups using a customer-centric approach, emphasizing hypothesis testing, iterative validation, and pivoting when needed. This framework is structured around two major phases: **Customer Discovery** and **Customer Validation**, each with defined stages that founders are expected to follow before scaling. In the context of this study, both CEO 1 and Angel Investor 1 have adopted practices that correspond to some of these steps, while diverging from others based on their unique strategic preferences, startup maturity, and market conditions. The following table maps their approaches against the core steps from The Startup Owner's Manual, highlighting adherence, partial implementation, or omission.

Table 8: *Summary of the gaps in The Startup Owner's Manual when evaluated against the actual needs and steps followed by the two case study founders.*

Startup Owner's Manual Step	**CEO 1 (Alga Insulation)**	**Angel Investor 1**
Customer Discovery: Problem Testing	✔ Conducted extensive problem research with industry experts and municipalities	✔ Validated pain points informally via expert networks
Customer Discovery: Solution Testing	✔ Ongoing development of a seaweed-based MVP with pilot companies	✔ Strong emphasis on iterative testing and early engagement
Business Model Hypotheses (Canvas)	✔ Defined value proposition, market type, and filed for a patent	✔ Evaluates and adapts iteratively but less formally structured
Market Size Assessment (TAM/SAM/Target)	✔ Market analysis conducted and validated with stakeholders	✘ Not explicitly addressed in early stages
Testing Customer Problems	✔ Engaged potential users and decision-makers	✔ Relies on industry feedback loops and expert conversations
Testing the MVP	✔ In development phase, engaging pilot customers	✔ Continuous testing with early adopters
Customer Validation: Phase I (Get Ready to Sell)	✘ Not at this stage, focused on certification	✘ Still in testing mode, no formal sales efforts yet
Customer Validation: Phase II (Try to Sell)	✘ Pre-revenue, dependent on regulatory approval	✔ Typically starts sales early to test demand
Customer Validation: Phase III (Refine and	✘ Not applicable yet	✔ Prioritizes strong positioning among early customers

Position)		
Customer Validation: Phase IV (Pivot or Proceed)	✘ No pivot yet, strategy still unfolding	✔ Has iterated and pivoted when required

6.2.3 Analysis & Gaps in The Startup Owner's Manual for ConTech

While *The Startup Owner's Manual* offers a detailed and structured guide for navigating the early stages of a startup, its applicability to ConTech startups presents certain limitations. The framework heavily emphasizes business model development and customer discovery processes, assuming a high degree of flexibility and speed in execution. However, ConTech startups often operate under industry-specific constraints that challenge this agile and iterative approach.

One significant issue lies in the overemphasis on business development relative to operational and regulatory realities. For instance, while customer discovery and hypothesis testing are central to the manual, they may not fully capture the long lead times required for material testing, safety certifications, and regulatory approvals within the construction industry. These delays are not only time-intensive but can stall the iterative cycles that the manual advocates.

Additionally, the framework presumes that most innovations are digital or software-based, yet many ConTech startups deal with hardware, physical materials, or environmental systems. These types of innovations require lab testing, piloting in real-world environments, and significant collaboration with policymakers or contractors. Unlike digital products that can be deployed and iterated rapidly, physical solutions face budgetary and logistical limitations that slow down feedback loops.

Another limitation relates to the assumption of a lean, founder-led team operating with broad technical capabilities. In ConTech, founders are often domain experts or commercial leads rather than technical engineers, making the execution of MVPs or rapid prototyping more resource-intensive. The manual does not sufficiently address the complexities of team building, manufacturing partnerships, or early-stage procurement strategies specific to such contexts.

The table below summarizes these gaps by mapping typical ConTech startup needs against the structure of *The Startup Owner's Manual*:

Table 9: *Overview of the identified gaps in The Startup Owner's Manual against typical ConTech startup needs.*

Startup Step	Included in Startup Owner's Manual?	Notes / Missing Elements in Startup Owner's Manual
Problem Identification & Market Research	Yes	Covered through customer discovery and hypothesis testing, but lacks emphasis on technical validation and industry-specific data gathering.
Business Model Development & Competitor Analysis	Yes	Well-supported via the Business Model Canvas and hypotheses, though complex hybrid models (digital + physical) are not deeply addressed.

Team Formation	Yes, however, it's lightly mentioned	Assumes cross-functional founder team; lacks detailed guidance on assembling ConTech-specific teams (e.g., engineers, architects, material scientists).
Financial Planning & Funding	Partially	Budgeting is iterative but underdeveloped; capital needs for physical testing and certifications not sufficiently addressed.
Legalization & Company Structure	No	Legal setup, IP registration, and compliance with construction standards are not mentioned.
Branding & Digital Presence	Basic information	Positioning and PR are discussed, but digital branding strategies and early reputation-building are limited.
Product Development & MVP	Yes	Strong focus on MVPs and iteration, especially for web/mobile products; physical product development is less emphasized.
Investment & Scaling	Yes, however, in general sense	Pivot or proceed logic exists, but lacks detailed guidance on investor relations, funding strategies, and scaling complex ConTech solutions.

6.3 Evaluating The Disciplined Entrepreneurship Framework

6.3.1 Overview of The Disciplined Entrepreneurship Approach

The Disciplined Entrepreneurship methodology, developed by Bill Aulet at the Martin Trust Center for MIT Entrepreneurship, presents a structured and integrative framework for launching scalable innovation-driven enterprises. Unlike more generalized startup approaches, this model is organized into 24 sequential steps divided across six thematic areas, covering everything from identifying customers to scaling the business. The model emphasizes that entrepreneurship is not an innate talent but a teachable process that can be systematized through logical progression and evidence-based decision-making (Maliszewski, 2018).

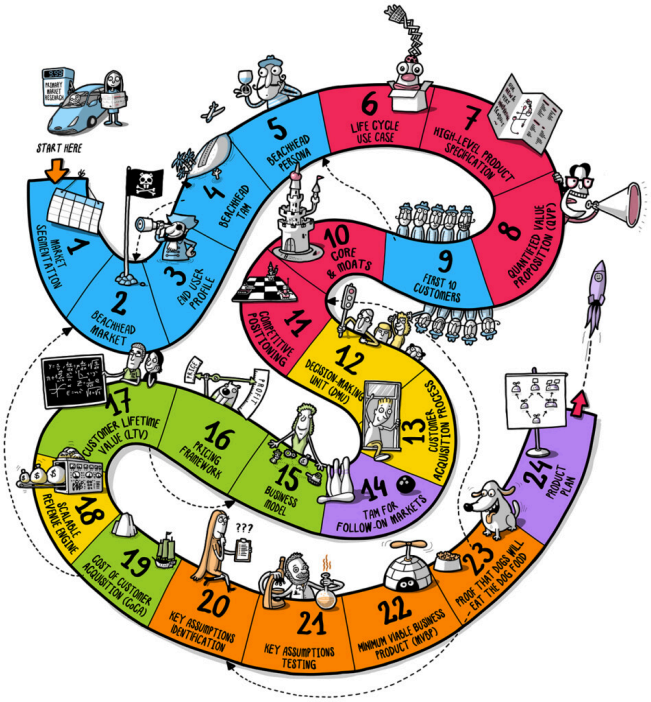


Figure 15: *The Disciplined Entrepreneurship Framework (Bill Aulet.,(2019))*

The first theme, "Who is your customer?", anchors the methodology in the belief that startups must begin with customer understanding. It involves segmenting potential markets, selecting a beachhead market, building a detailed end-user profile, estimating the Total Addressable Market (TAM), and creating a persona representing the ideal user. This focus ensures founders build with a real and validated market in mind rather than assumptions.

The second theme, "What can you do for your customer?", guides entrepreneurs to understand the customer's full experience with the product, define the core value proposition, and visualize the product's form and function. This includes developing the Full Life Cycle Use Case, designing a High-Level Product Specification, and quantifying the value proposition for the identified persona. These steps move the founder toward product-market fit while refining the startup's competitive advantage.

The third theme, "How does your customer acquire your product?", addresses sales and customer acquisition. It includes identifying the Decision-Making Unit (DMU), mapping the process of acquiring a paying customer, and determining the sales process. These steps are critical for understanding both the mechanics and economics of early sales, which are essential for sustainable scaling.

Next, the fourth theme, "How do you make money off your product?", focuses on financial sustainability. This includes designing a revenue-generating business model, establishing a pricing framework, and calculating both Customer Lifetime Value (LTV) and the Cost of Customer Acquisition (COCA). These unit economics help validate the business's long-term viability and clarify the path to profitability.

The fifth theme, “How do you design and build your product?”, introduces disciplined experimentation through the identification and testing of key assumptions. Founders are guided to define a Minimum Viable Business Product (MVBP), a concept distinct from the MVP in Lean Startup, as a testable product that delivers value, gets paid for, and starts an iterative feedback loop. The final step in this theme, “Show the dogs will eat the dog food,” emphasizes validating customer willingness to pay with concrete, quantitative evidence.

Finally, the sixth theme, “How do you scale your business?”, focuses on long-term growth. Entrepreneurs are instructed to estimate the Follow-on TAM and develop a product roadmap to guide functionality and market expansion beyond the initial customer base. This signals readiness to scale with a proven foundation (Maliszewski, 2018).

What distinguishes the Disciplined Entrepreneurship framework is its linear yet iterative structure. While steps are meant to be followed in order, they allow for continuous reflection and refinement, a spiraling approach toward product-market fit. The methodology integrates strategic thinking with operational execution, providing a rigorous roadmap especially suited for innovation-driven startups tackling complex problems.

Below a summary table for the 24 steps in the Disciplined Entrepreneurship (Bill Aulet, 2019)

Table 10: *A summary for the 24 steps in the Disciplined Entrepreneurship.*

Theme	Step	Title	Description
1-Who is your Customer	1	MARKET SEGMENTATION	WHAT? Brainstorm & identify how your idea/technology can serve a variety of potential end users. Primary market research is then used to fill out a matrix. WHY? It is crucial to start process with customer and work everything back from there.
1-Who is your Customer	2	SELECTING A BEACHHEAD MARKET (BHM)	WHAT? Select one market segment from step #1 where you feel you have the highest odds of success and it has strategic value. WHY? As a startup you have limited resources and focus is essential.
1-Who is your Customer	3	END USER PROFILE	WHAT? Using primary market research techniques build out a description including demographic information & increasingly specific information about their needs & wants. WHY? There are 3 reasons: (1) to keep the focus on the end user, (2) to deepen your understanding of the primary customer, (3) to calculate the TAM in the next step
1-Who is your Customer	4	TOTAL ADDRESSABLE MARKET (TAM)	WHAT? Estimate of the dollars per year you will get in your beachhead market if you achieve 100% market share. WHY? To make sure your

		FOR BHM	beachhead market is not too big or too small.
1-Who is your Customer	5	PERSONA FOR BHM	WHAT? Identify one actual real end user in your beachhead market that best represents your end user profile. WHY? Creates great focus in your organization and serves as a touchstone for all decisions going forward.
2-What can you do for your customer?	6	FULL LIFE CYCLE USE CASE	WHAT? Understand & describe how your product will fit into the persona's work flow. WHY? This will provide valuable information for future steps and also help the team understand potential barriers to adoption from a sales perspective.
2-What can you do for your customer?	7	HIGH-LEVEL PRODUCT SPECIFICATION	WHAT? Create a visual description of the product as well as making a simple draft brochure. WHY? You need to make sure your team all has a common agreement on what the product is.
2-What can you do for your customer?	8	QUANTIFY THE VALUE PROPOSITION	WHAT? Summarize in as concrete a way as possible the value your product will create for the target customer. WHY? Customers buy based on value; needs to be clear you can show it.
1-Who is your Customer	9	IDENTIFY NEXT 10 CUSTOMERS	WHAT? Create a list of the next 10 customers after the persona who closely fit the end user profile. WHY? Validates the persona and all the assumptions you have made so far.
2-What can you do for your customer?	10	DEFINE YOUR CORE	WHAT? Determine the single thing that you will do better than anyone else that will be very difficult for others to copy. WHY? Having a clear definition of your core will allow you to focus your limited resources to build & reinforce it.
2-What can you do for your customer?	11	CHART YOUR COMPETITIVE POSITION	WHAT? Represent visually your position relative to the other alternatives in the persona's top two priorities. WHY? Customers don't care about your "core." But they do care about benefits relating to their priorities.
3-How does your customer acquire your product?	12	DETERMINE THE DECISION-MAKING UNIT (DMU)	WHAT? Determine all the people who are involved in making the decision to acquire your product - including influencers. WHY? This starts the process to determine the cost of customer acquisition.
3-How does	13	MAP THE	WHAT? Detail how the members of the DMU

your customer acquire your product?		PROCESS TO ACQUIRE A PAYING CUSTOMER	make a decision to buy your product. WHY? This will be a critical input to determine the length of the sales cycle & identify critical bottlenecks in the process.
6-How do you scale your busiess	14	FOLLOW-ON TAM	WHAT? Calculate the annual revenues from the top follow-on markets after you are successful in your beachhead market. WHY? It shows the potential that can come from winning your beachhead and motivates you to do so quickly and effectively.
4-How do you make money off your product	15	DESIGN BUSINESS MODEL	WHAT? Review different ways to get paid for your product and choose one best aligned with all key stakeholders' interest. WHY? Wise selection of a value extraction business model can dramatically reduce COCA, increase lifetime value of an acquired customer (LTV) and provide you with competitive advantage.
4-How do you make money off your product	16	PRICING FRAMEWORK	WHAT? Determine a framework to test pricing for your new product and make a decision on what the initial price will be. WHY? Small changes in pricing can have a huge impact on your profitability.
4-How do you make money off your product	17	CALCULATE THE LIFETIME VALUE OF AN ACQUIRED CUSTOMER (LTV)	WHAT? Estimate the Net Present Value of the total profits you will get from a new customer over the life time of that customer. WHY? To complete the unit economics, you now need to estimate & understand the drivers of the LTV and it should get to at least 3X the COCA.
3-How does your customer acquire your product?	18	MAP THE SALES PROCESS	WHAT? Visually map the short, medium and long-term ways you will create and fulfill demand for your product. WHY? This will be critical input to calculating the COCA over time.
4-How do you make money off your product	19	CALCULATE THE COST OF CUSTOMER ACQUISITION (COCA)	WHAT? Estimate the total marketing & sales expense in a given period to get new customers & then divide this by the number of new customers. WHY? The unit economics are a simple but effective proxy for how sustainable & attractive your business will be as it scales.
5-How do you design &	20	IDENTIFY KEY ASSUMPTIONS	WHAT? Identify key assumptions to be tested before you begin to make heavy investments in

build your product			product development. WHY? It will be faster & much less costly now to test the assumptions and allow you to preserve valuable resources & make adjustments as needed.
5-How do you design & build your product	21	TEST KEY ASSUMPTIONS	WHAT? Test, through a series of small & inexpensive experiments, each of the individual assumptions you have identified in step #20. WHY? This scientific approach will allow you to understand which assumptions are valid & which ones are not, giving you time to adjust while the cost and time to do so is minimal.
5-How do you design & build your product	22	DEFINE MINIMUM VIABLE BUSINESS PRODUCT (MVBP)	WHAT? Define the minimum product that you can use to test whether your customer gets value from the product and whether you can get paid for it, and that starts an iterative feedback loop with the customer. WHY? You must reduce the variables in the equation to get the customer feedback loop started with the highest possibility of success with simultaneously the most efficient use of your scarce resources.
5-How do you design & build your product	23	SHOW THE DOGS WILL EAT THE DOG FOOD	WHAT? Offer your MVBP to your target customer & obtain quantitative metrics regarding the adoption rate of the product, the value the target customer is getting from the product & proof that someone is paying for the product. WHY? Numbers don't lie. Show concrete evidence & don't rely simply on anecdotal evidence.
6-How do you scale your busiess	24	DEVELOP A PRODUCT PLAN	WHAT? Develop a longer-term plan to add functionality so you can address additional markets. WHY? It is important to think ahead & have a plan so people are ready to keep moving forward after the MVBP.

6.3.2 Comparison to Real-World Cases

The Disciplined Entrepreneurship framework presents a comprehensive, structured approach for launching scalable startups through 24 sequential steps. When mapped against the real-world cases of CEO 1 and Angel Investor 1, clear differences emerge in how strictly the steps are followed. Jana's startup, Alga Insulation, aligns closely with the disciplined structure, particularly in market research, validation, and product development. Her methodical approach resonates with many of the early and mid-stage steps in the model. In contrast, Fredrik adopts a more iterative, network-driven strategy, bypassing several formalized stages in favor of rapid experimentation and real-time

feedback from industry peers. The table below illustrates which steps were reflected in each founder's journey and highlights any omissions or gaps.

Table 11: *Summary of the gaps in The Disciplined Entrepreneurship framework when evaluated against the actual needs and steps followed by the two case study founders.*

Step No.	Step Title	Reflected in Jana's Approach?	Reflected in Fredrik's Approach?
1	Market Segmentation	□ Structured research identified key segments	⚠ Implicit, not formally segmented
2	Selecting a Beachhead Market (BHM)	□ Focused on sustainable insulation	⚠ Flexible target selection, not clearly defined
3	End User Profile	□ Detailed profile through stakeholder input	☒ Skipped detailed profiling
4	TAM for BHM	□ Quantified using industry benchmarks	☒ Not calculated or prioritized
5	Persona for BHM	⚠ Stakeholder-based focus, not one persona	☒ No formal persona development
6	Full Life Cycle Use Case	□ Mapped use through construction validation	⚠ Understood via expert feedback, informal
7	High-Level Product Specification	□ Developed product spec for certification	⚠ Developed iteratively
8	Quantify the Value Proposition	□ Emphasized sustainability and regulation fit	⚠ Assumed value based on feedback
9	Identify Next 10 Customers	⚠ Validated with a few large construction firms	☒ No structured validation with early pool
10	Define Your Core	□ Sustainability as key differentiator	⚠ Execution-focused, core value less defined
11	Chart Your Competitive Position	□ Industry benchmarks and certification	⚠ Competitive positioning informal
12	Determine the DMU	⚠ Engaged firms and regulators	⚠ Understood through networks
13	Map Process to Acquire Customer	⚠ Started via firm pilots and testing	☒ No documented acquisition path
14	Follow-On TAM	□ Long-term scaling considered	☒ No clear follow-on strategy

15	Design Business Model	□ Patent and sustainability funding aligned	⚠ Revenue assumptions, loosely structured
16	Pricing Framework	☒ Not defined yet, pre-revenue	☒ Not formalized
17	Calculate LTV	☒ Not calculated	☒ Not calculated
18	Map the Sales Process	⚠ Focused on initial partnerships	☒ Not documented
19	Calculate COCA	☒ Not defined	☒ Not calculated
20	Identify Key Assumptions	□ Assumptions tested via research	⚠ Assumed, but not rigorously tested
21	Test Key Assumptions	□ Early pilots with large firms	⚠ Feedback-driven iterations
22	Define MVBP	□ Linked to certification milestones	⚠ Iterated on early prototypes
23	Show Dogs Will Eat Dog Food	□ In-field testing planned before scaling	⚠ Informal testing with initial adopters
24	Develop Product Plan	□ Expansion roadmap in place	☒ Focused on short-term cycles

6.3.3 Analysis & Gaps in Disciplined Entrepreneurship for ConTech

While the Disciplined Entrepreneurship (DE) framework offers a highly structured roadmap for launching scalable startups, its assumptions may not fully align with the realities of ConTech ventures. The 24-step process is particularly effective for guiding startups through problem-solution fit, business model design, and product-market fit. However, its limitations become apparent when applied to industries like construction technology.

The framework places significant emphasis on product specification, customer engagement, and market segmentation. In doing so, it gives limited attention to real-world constraints such as operational planning, regulatory complexities, and the innovation cycles typical for non-software products. Moreover, the DE framework tends to assume a level of startup agility that may not be feasible for ConTech entrepreneurs who often work with hardware, new materials, and certification-heavy solutions.

The table below identifies elements commonly found in ConTech startup journeys that are either partially addressed or missing from the DE approach.

Table 12: *Overview of the identified gaps in The Disciplined Entrepreneurship framework against typical ConTech startup needs.*

Startup Step	Included in Disciplined Entrepreneurship?	Notes / Missing Elements in Disciplined Entrepreneurship
Problem Identification & Market Research	Fully integrated	Strong focus on segmentation, TAM, and persona development
Business Model Development & IP Strategy	Included	Clear emphasis on business model design and competitive positioning
Team Formation	Not addressed explicitly	Lacks guidance on team roles, hiring, or founder dynamics
Financial Planning & Funding Strategy	Briefly covered	Lifetime value and COCA calculated, but lacks broader financial roadmap
Legalization & Regulatory Navigation	Not covered	No attention to legal entity setup, compliance, or certification steps
Branding & Digital Presence	Overlooked	No clear steps regarding branding, messaging, or digital strategy
Operational Execution & Scalability	Missing	Post-MVBP operations, HR, and scaling logistics not covered
Hardware & Material Innovation	Implied in MVP/MVBP	Assumes iterative loops work similarly for hardware as for software
Investment & Strategic Scaling	Briefly referenced	Raises LTV and COCA concepts but lacks guidance on investor alignment

6.4 Identifying Gaps in Existing Startup Methodologies

The analysis of the Lean Startup methodology, The Startup Owner's Manual, and the Disciplined Entrepreneurship framework reveals several recurring limitations when these models are applied to ConTech startups. While each of these frameworks offers valuable guidance for product development, customer discovery, and business model validation, they consistently prioritize product and market experimentation over other critical areas required for launching sustainable businesses in regulated and infrastructure-heavy industries.

One of the most prominent gaps across all three methodologies is the lack of emphasis on operational execution. Elements such as legal structure, regulatory compliance, and internal operational planning are either lightly addressed or omitted entirely. This is especially problematic in the ConTech sector, where regulatory standards, safety certifications, and long project timelines are central to the go-to-market process.

Another shared limitation is the assumption that startup founders possess strong technical backgrounds. In practice, many founders, particularly in industries like construction, come from

commercial, operational, or research-intensive roles rather than from software development. The existing methodologies do not offer sufficient support for team formation, skills alignment, or building execution capacity when founders are not technical.

Furthermore, these methodologies tend to overlook the nuances of hardware and material-based innovation. The iterative loops promoted by Lean Startup and Disciplined Entrepreneurship are well-suited to software and digital products but less applicable to startups working with physical products requiring manufacturing, testing, and certification. The time, cost, and complexity of these cycles are rarely acknowledged in the standard models.

Additionally, all three methodologies largely adopt linear step-by-step frameworks. While they emphasize iteration, the structure remains sequential, progressing from ideation to MVP to market entry. This does not reflect the reality of many ConTech startups, which often need to develop team capacity, secure financing, navigate legal barriers, and build product infrastructure simultaneously. A more adaptive, non-linear structure is required to address these challenges.

What is missing, therefore, is a startup blueprint that integrates business operations and product development in parallel rather than sequentially. A more holistic framework is needed, one that explicitly includes team formation, legal setup, financial planning, and operational execution alongside product and customer development. Such a methodology must also support a non-linear, iterative process tailored to the realities of industry-specific innovation, particularly in sectors like ConTech that involve physical products, complex regulations, and extended go-to-market timelines.

7. The Refined ConTech Startup Blueprint

This chapter introduces a new framework specifically designed to guide the formation and development of startups within the construction technology (ConTech) sector. Drawing on the strengths and limitations of existing startup methodologies, such as the Lean Startup, The Startup Owner's Manual, and Disciplined Entrepreneurship, this blueprint was developed to address the unique challenges faced by founders in an industry characterized by regulatory complexity, long sales cycles, hardware-centered innovation, and non-linear growth dynamics.

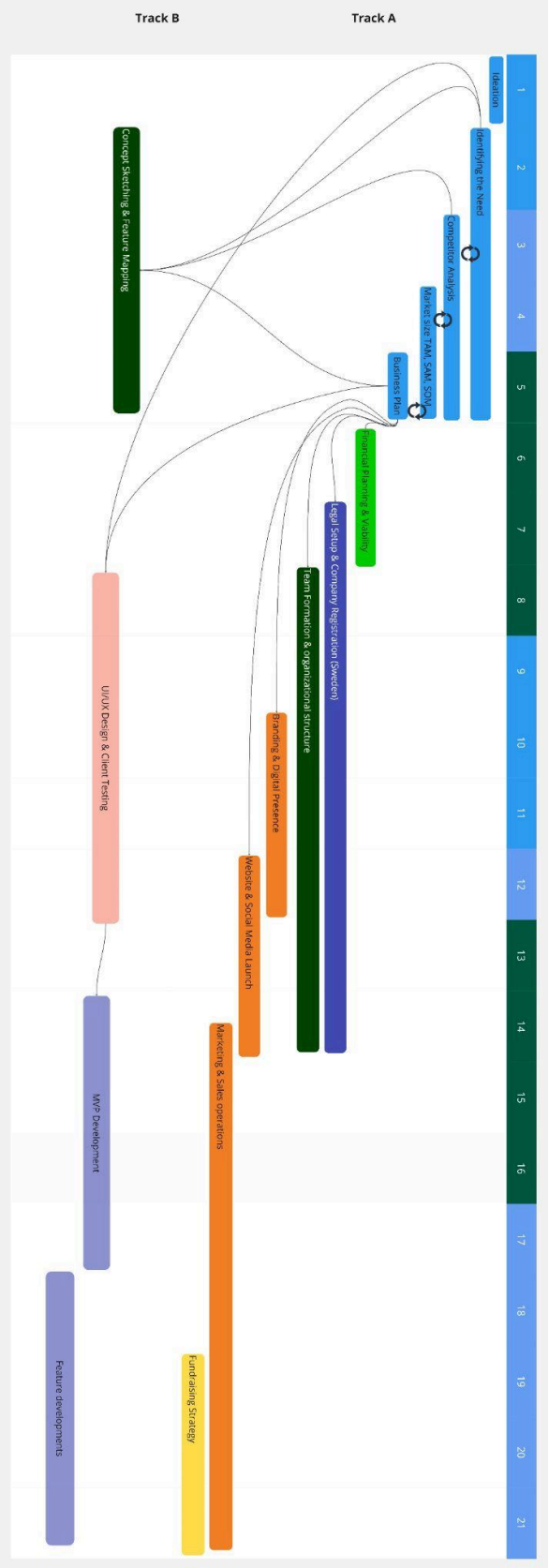
The refined blueprint is not intended as a one-size-fits-all prescription, but rather as a flexible and modular roadmap that acknowledges the reality that startup journeys differ based on context, team composition, and market conditions. In particular, this model is designed to support non-technical founders, early-stage teams, and innovation-driven ventures that must simultaneously build a viable business operation and a functional product or service.

Based on empirical material gathered from six expert interviews, CEO 2 (CEO at MustaLiitu), Angel Investor 2 (angel investor and business developer), Angel Investor 1 (angel investor and office manager at FOJAB), CEO 1 (founder of Alga Insulation), Management Consultant 1 (senior Management Consultant at Knowit), and Business Developer 1 (Head of Business Development and Innovation at Incoord), as well as case studies of two startups in formation, this framework integrates real-world experiences with structured startup-building theory. It reflects the need for parallel development tracks, whereby business operations and product/service development evolve concurrently rather than sequentially.

The following sections outline the structure and logic of this framework, followed by a detailed breakdown of its phases. Each step includes the objective, core actions, recommended tools or methods, and real-world insights from the case studies, all while maintaining an industry-specific focus tailored to the ConTech environment.

7.2 Overview of the Blueprint Structure

The ConTech Startup Blueprint introduced in this chapter (See figure 16) is built on the recognition that startup development is rarely linear, especially in industries like construction technology, where product innovation and business formation must often progress in parallel. Traditional methodologies, while valuable, tend to follow sequential logic. However, empirical insights gathered throughout this study suggest that real-world startup formation in the ConTech sector requires a more adaptive and dual-tracked approach.



This blueprint is, therefore, organized around two concurrent tracks:

- **Track A: Business Formation & Operations**
- **Track B: Product and Service Development**

Rather than isolating product development from business strategy, this framework emphasizes interdependency between operational setup and technical or service innovation. Founders are guided to work on both tracks simultaneously, balancing strategic decision-making with iterative testing and real-world feedback.

Each track is further divided into structured steps, beginning with ideation and hypothesis formulation, and progressing through market validation, competitive analysis, and legal setup, all while developing the product concept, brand identity, and digital presence. Notably, the blueprint is designed to remain flexible: some steps may be executed faster or slower depending on the context, and certain actions, such as market research and user feedback, are expected to loop iteratively as new insights emerge.

Visual components such as timelines, flowcharts, and process maps (to be included in this chapter) serve as visuals to simplify the inherently complex nature of startup development. By structuring the blueprint in this modular way, the aim is to support founders, especially non-technical ones, with a step-by-step yet dynamic roadmap that bridges theory with practice.

Figure 16: *Overview of the ConTech Startup Blueprint Structure (Author figure)*

The sections that follow will explore each track in detail, beginning with the core operational phases in Track A, followed by Track B's product development logic, and ending with a breakdown of parallel steps such as legal registration, team formation, branding, and fundraising preparation. This structure is intended to reflect not only the theoretical principles derived from literature, but also the practical execution patterns observed in the case studies and expert interviews that informed this thesis.

7.3 Track A: Business Formation & Operations

This track constitutes the strategic backbone of the startup blueprint, guiding founders from the earliest stage of idea articulation through to a fully defined business model and market strategy. This track incorporates iterative loops across steps, particularly during market validation phases, and is meant to be executed in parallel with Track B (Product & Service Development).

The steps within this track are structured to help founders, especially non-technical ones, develop a clear understanding of their customer, validate their business concept, and prepare for operational execution. While these steps are written sequentially, several of them run in parallel, overlap in timing, and evolve based on new data collected from research, competitor analysis, or early feedback.

The output of this track is a fully validated and investor-ready business plan that includes a clearly defined value proposition, a focused market entry strategy, a viable business model, and a tested understanding of customer needs, all built with industry-specific insight tailored to ConTech startups.

7.3.1 Ideation & Hypothesis Framing

The initial phase of the Business Formation and Operations track is dedicated to the systematic articulation of the founder's preliminary business concept. This phase, referred to as *Ideation*, serves as a foundation for the subsequent development and validation of the startup's value proposition, customer focus, and strategic orientation. The objective is to consolidate unstructured ideas into coherent hypotheses that will form the basis for targeted research and refinement in later stages. For an applied example of this step, see Appendix A.2.1 (Permitt.ai Implementation).

Objective

To formalize the initial business concept into a structured set of hypotheses regarding the customer, the problem being addressed, the proposed solution, and its potential market viability.

Methodology and Key Actions

This phase employs the Business Model Canvas (BMC) as the principal tool for organizing the business concept into its fundamental components; an illustration of the BMC is presented in Figure 17. Through an intensive, time-bound brainstorming process, the founder systematically completes the BMC, focusing on:

- Identifying potential customer segments.
- Articulating the perceived problem and proposed solution.

- Drafting assumptions about revenue models and pricing strategies.
- Outlining preliminary ideas concerning value delivery and operational needs.

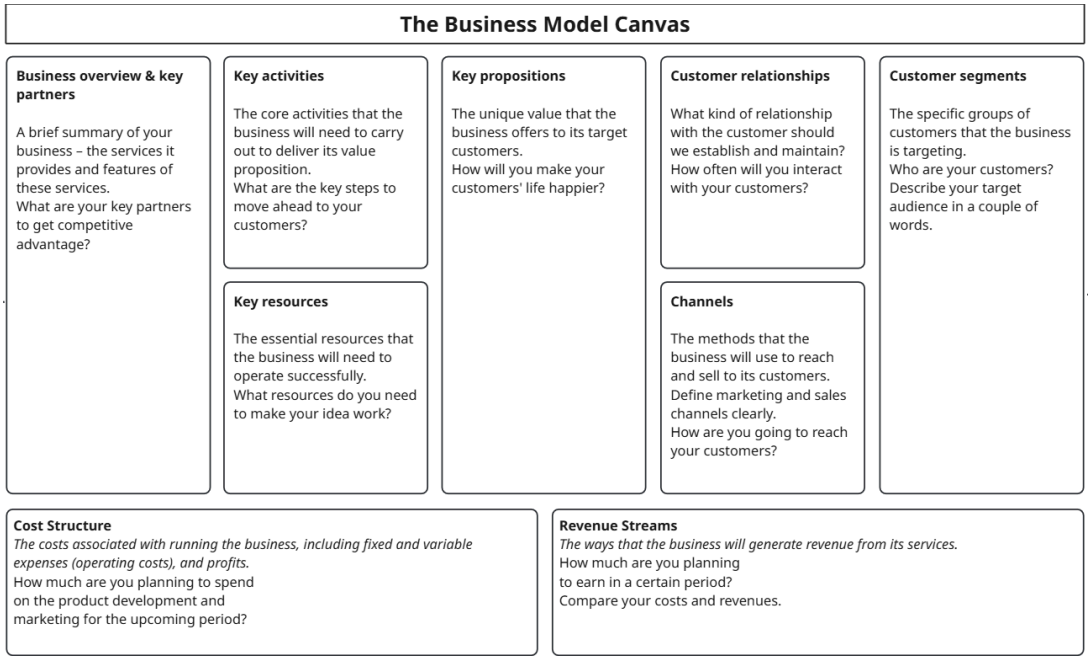


Figure 17: *Business Model Canvas (Author figure)*

At the conclusion of this phase, the founder formulates a set of hypotheses addressing the following:

- Who constitutes the target user group?
- What are their primary unmet needs or pain points?
- How does the proposed solution address these needs?
- What is the assumed pricing model, and what are the core product or service features?

These hypotheses provide the initial framework for empirical validation in subsequent stages.

Tools and Deliverables

- **Completed Business Model Canvas**: Captures all initial assumptions about the business structure.
- **Hypothesis Map:** A visual mind map illustrating the interconnections between customer needs, the proposed solution, and value creation (an example contextualized for the Permitt.ai case study is provided in Figure 18).
- **Documented Hypotheses**: A structured list of testable assumptions.

Figure 18: *Permit.ai Hypothesis map (Author figure)*

Duration

This phase is designed to be completed within one week, allowing focused engagement without delaying the validation process.

Integration with Track B (Product Development)

Although primarily focused on business formation, early notions of the product or service may begin to emerge. These preliminary ideas provide initial input into the parallel development of sketches or concepts in Track B.

7.3.2 Identifying the Need

Following the formulation of initial hypotheses, this phase focuses on systematically validating the existence of a real, significant problem within the target market. Referred to as "Identifying the Need," this step serves to test and refine the assumptions made during ideation regarding customer pain points and market gaps. The process combines secondary and primary research to ensure that the startup is addressing a genuine, unmet demand. For an applied example of this step, see Appendix A.2.2 (Permitt.ai Implementation)

Objective

To empirically verify that the problem identified is both substantial and relevant to a clearly defined customer segment, and to gather detailed insights into customer preferences, behaviors, and unmet needs.

Methodology and Key Actions

Substep A: Secondary Research

Duration: **Week 1**

The initial research phase involves gathering and analyzing existing data to contextualize the problem within its broader market and industry setting. Founders explore:

- Industry reports, academic studies, and regulatory documents.
- Existing solutions and competitive offerings.
- Market trends and historical performance data.

Outcome: A refined understanding of the market landscape and the development of an initial End User Profile, which will guide primary research.

Substep B: Primary Research

Duration: **Week 2–3**

Building on the secondary insights, this phase engages directly with potential customers to validate the hypotheses from **7.3.1**. The founder interacts with individuals who match the target End User Profile, employing techniques such as:

- Semi-structured interviews.
- Surveys targeting specific user groups.
- Smoke tests, landing pages, or prototype interactions.
- Focus groups for qualitative exploration.

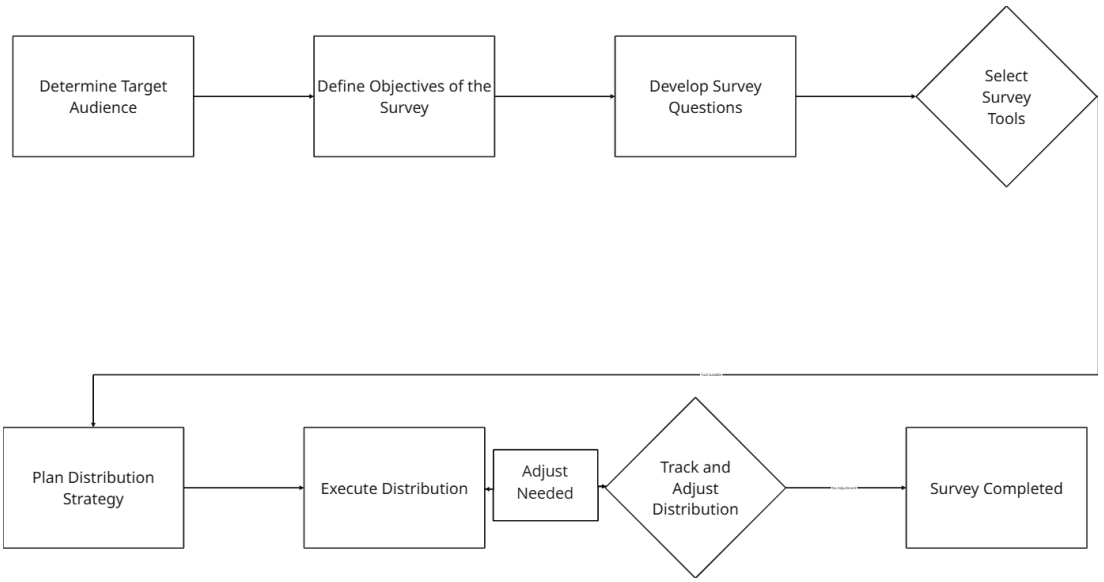


Figure 19: *Example flowchart for Survey distribution*

Key Consideration: Maintaining ongoing relationships with these early contacts is critical for future phases, including product testing and early adoption.

Tools and Deliverables

- **Research Log**: Documentation of sources, findings, and implications from secondary research.
- **User Interaction Summary**: Key themes and patterns from interviews, surveys, and tests.
- **Validated End User Profile**: A detailed persona based on empirical data, including demographic, behavioral, and psychographic traits.

Duration

The complete need identification process spans approximately three weeks, overlapping partially with steps 7.3.3 (Competitive Analysis) and feeding directly into subsequent validation activities.

Integration with Track B (Product Development)

Insights gathered here directly inform Track B by shaping early sketches and value proposition framing. Understanding user workflows, preferences, and pain points ensures that product conceptualization aligns with validated customer needs.

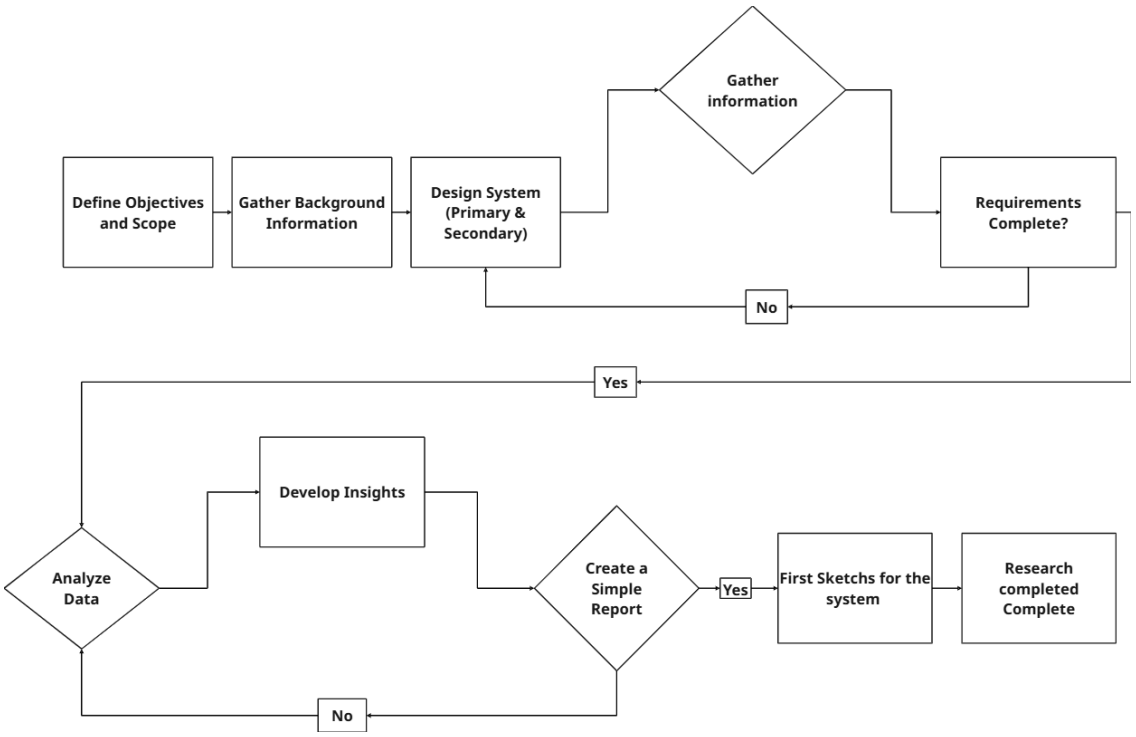


Figure 20: *Example flowchart for Research Timeline*

7.3.3 Competitive & Pricing Analysis

To systematically analyze existing competitors' offerings, business models, and customer feedback in order to refine the startup's value proposition, user profile, and positioning. For an applied example of this step, see Appendix A.2.3 (Permitt.ai Implementation)

Key Actions:
This step is executed concurrently with primary market research (Substep B of 7.3.2), enabling the founder to integrate competitor insights directly into conversations with potential customers. By studying competitors' solutions, pricing strategies, and market positioning, the founder can better identify gaps in the market and define a superior offer.

The analysis should not focus solely on pricing; instead, it must encompass a broader evaluation of how competitors address customer pain points, the perceived effectiveness of their solutions, and the satisfaction levels expressed by their users. Special attention should be paid to customer reviews, case studies, and feedback available through public sources or interviews with customers who have used competing solutions.

Key elements to analyze include:

- Core features and functionalities offered.
- Business model structure (e.g., subscription, pay-per-use, upfront purchase).
- Pricing models and their transparency.
- Strengths and weaknesses as perceived by customers.

- Any evident service gaps, dissatisfaction points, or unmet needs.

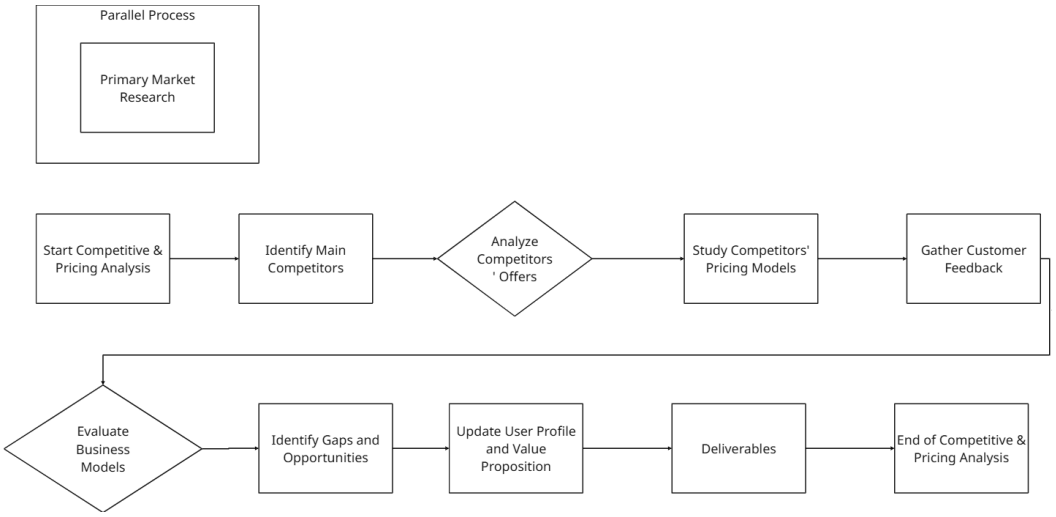


Figure 21: *Example Flowchart on the competitive analysis steps*

This multidimensional understanding will allow the founder to sharpen the startup's own value proposition, better differentiate from existing offerings, and refine their ideal customer profile based on validated insights rather than assumptions.

Tools and Deliverables:

- Competitor benchmarking matrix (features, pricing, customer feedback).
- SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) of key competitors.
- Updated user profile integrating market feedback.

Duration:
Conducted during Week 2–3, alongside primary research efforts.

Integration with Track B (Product Development):
Findings from competitive analysis will inform early sketches of the product or service in Track B, helping to ensure that initial designs address genuine gaps in the market and position the startup favorably against competitors.

7.3.4 Market Sizing & Opportunity Validation

To quantitatively define the size and characteristics of the target market, ensuring that the startup addresses a sufficiently large but underserved segment. This step focuses on validating the strategic opportunity using TAM, SAM, and SOM frameworks while identifying a niche (blue ocean) where competition is minimal. For an applied example of this step, see Appendix A.2.4 (Permitt.ai Implementation)

Key Actions:

- Return to secondary research sources to calculate the number of potential users who match the refined end-user profile.

- Estimate the Total Addressable Market (TAM), Serviceable Available Market (SAM), and Serviceable Obtainable Market (SOM).
- Focus on isolating a small but strategically valuable niche within the broader market, applying blue ocean strategy principles.
- Conduct iterative refinement: revisit assumptions from Step 7.3.2 (Identifying the Need) and Step 7.3.3 (Competitive & Pricing Analysis) to update market definitions as new insights are gathered.

Tools and Deliverables:

- Market Research Reports
- TAM/SAM/SOM Calculation Models
- Segmentation Mapping Tools
- Updated Customer Personas aligned with validated opportunity

Duration:

Approximately 1–2 weeks, overlapping with final iterations of customer discovery and competitive analysis.

Integration with Track B (Product Development):

Precise definition of market size and customer segments directly informs decisions about minimum viable feature sets (for MVP design) and initial marketing strategies.

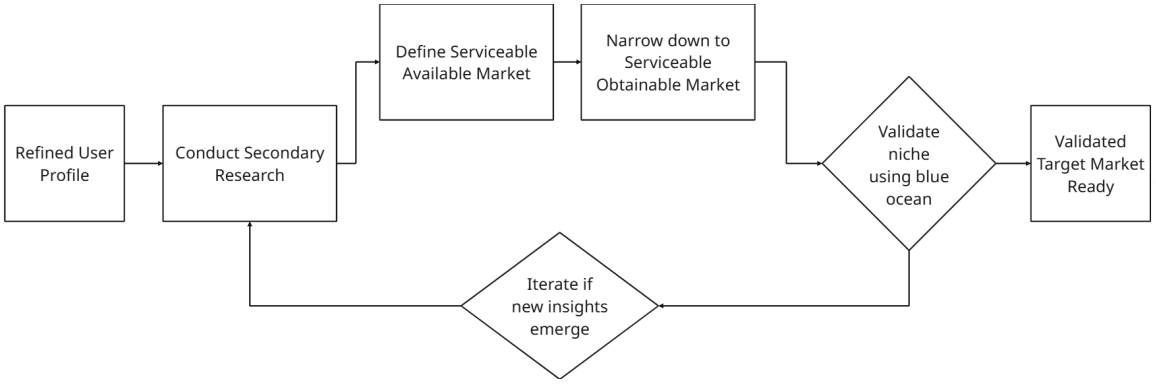


Figure 22: *Example Flowchart on defining the market size*

7.3.5 Business Plan Development

The purpose of this step is to consolidate all research findings, strategic insights, and validated assumptions into a structured, investor-ready business plan. This document serves as the foundation for both internal execution and external communication with potential investors, partners, and early team members. For an applied example of this step, see Appendix A.2.5 (Permitt.ai Implementation)

Key Actions

- Synthesize outputs from previous steps: validated hypotheses, customer discovery, competitive analysis, market sizing (TAM/SAM/SOM), and pricing strategy.

- Develop a comprehensive business plan that frames the startup's offer, target audience, market potential, competitive positioning, business model, and go-to-market (GTM) strategy.
- Refine the narrative to position the startup as a compelling opportunity for investment or strategic partnerships.

Tools and Deliverables

- **Business Plan Template**: A structured format ensuring consistency across the following sections:
    - Overview of the product or service offering
    - Target customer profile and segmentation
    - Market size calculations (TAM, SAM, SOM) and blue ocean positioning
    - Competitive landscape and differentiators
    - Business model structure (revenue streams, cost structure, pricing strategy)
    - Go-to-market plan (initial acquisition strategy, channel partners, early traction approach)

- Visuals: Simplified market diagrams, competitor maps, and customer journey outlines.

Duration
Estimated duration: 1–2 weeks, depending on the complexity of the business model and the depth of prior validation work.

Integration with Track B (Product Development)
While the business plan solidifies the operational and market strategy, it should inform ongoing product sketching and MVP feature prioritization. Insights from early market research feed into both sides, ensuring alignment between the business proposition and the product development roadmap.

7.3.6 Financial Planning & Viability
This step focuses on establishing a preliminary financial framework for the startup, ensuring that the business concept is not only desirable and feasible but also economically viable. It prepares the foundation for future fundraising efforts, operational planning, and financial decision-making. For an applied example of this step, see Appendix A.2.6 (Permitt.ai Implementation)

Key Actions
- Develop a basic budget outlining anticipated expenses for product development, marketing, operations, and administration during the first 12–18 months.
- Create a 3-year financial projection, including revenue assumptions based on market size estimates (TAM/SAM/SOM) and go-to-market strategies.
- Conduct a basic break-even analysis to determine the minimum required sales volume or customer acquisition needed to sustain operations.
- Build scenario-based financial models for the MVP phase, considering best-case, expected-case, and worst-case outcomes to guide early financial risk management.

Tools and Deliverables

- **Startup Budget Template** (covering fixed and variable costs)
- **3-Year Financial Projection Sheet** (revenue, cost of goods sold, gross margin, operational costs, EBITDA)
- **Break-even Analysis Table** (units sold, customer acquisition targets)
- **Scenario Planning Matrix** (e.g., MVP adoption rates, development delays, early market traction levels)

Duration

Estimated duration: up to 2 weeks.
This step can run parallel with early business plan drafting but must be finalized before moving into legal formation and formal fundraising preparation.

Integration with Track B (Product Development)

The financial assumptions must reflect the realities of the MVP's feature set, development cost estimates, and early user acquisition plans. Close collaboration between the founder and technical advisors (if available) is essential to ensure realistic budgeting.

7.3.7 Legal Setup & Company Registration (Sweden)

This Legal Setup & Company Registration step formalizes the startup's existence by establishing a legal entity, a necessary condition for securing a bank account, issuing invoices, applying for funding, and signing contractual agreements. Although mostly procedural, timely execution of this step is critical for operational readiness. For an applied example of this step, see Appendix A.2.7 (Permitt.ai Implementation)

Key Actions

- **Open a startup bank account** and deposit the required share capital (minimum SEK 25,000 for Aktiebolag [AB]).
- **Register the company at Bolagsverket** (Swedish Companies Registration Office), submitting the necessary documents including bank certificate, articles of association, and registration forms.
- Upon receipt of the organizational number, **apply for F-skatt (tax registration)**, **Moms (VAT registration)**, and **Arbetsgivare (Employer registration)** through Skatteverket (Swedish Tax Agency).

Tools and Deliverables

- Bolagsverket Registration Portal
- Swedish bank startup account setup forms
- Skatteverket registration applications (F-skatt, Moms, Arbetsgivare)

Duration

- **Bank account setup**: ~2–3 weeks (including capital deposit verification)
- **Bolagsverket registration**: ~1–3 weeks after bank account confirmation

- **Skatteverket registrations**: ~2–6 weeks after receiving the organizational number

Time Commitment
While the total timeline spans 6–9 weeks, the founder's active involvement is limited to a few hours for form preparation and submission.
The majority of this step consists of waiting periods for institutional processing.

Integration with Track B (Product Development)
Since legal registration is primarily a waiting process, founders can proceed simultaneously with organizational structure planning (Step 7.3.8), branding (Step 7.3.9), and MVP conceptualization in Track B.

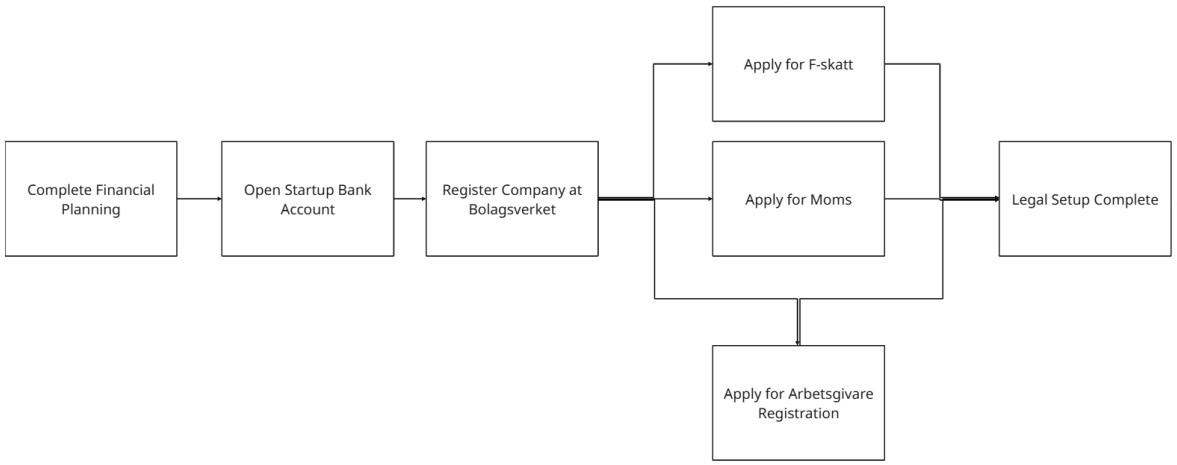


Figure 23: *Example Flowchart on the Legal setup steps*

7.3.8 Team Building & Organizational Structure

To define the skill sets needed for the startup's success, establish an initial organizational structure, and begin the recruitment of key co-founders or partners, particularly addressing the needs of non-technical founders. For an applied example of this step, see Appendix A.2.8 (Permitt.ai Implementation)

Key Actions:

- **Define Critical Skills and Roles:**
  After taking the initial steps of the legal setup phase, the founder should conduct a skills gap analysis to determine which competencies are needed within the founding team. Priority must be given to technical (e.g., engineering or product development) and commercial (e.g., marketing and sales) expertise, as these are the primary drivers of early-stage success.
- **Organizational Structure Planning:**
  Develop a basic organizational structure (*see figure 24 below*) that identifies the essential roles needed for the first 12–24 months. It is recommended to initially avoid non-critical roles such as HR or operational administration, given limited resources at this stage.

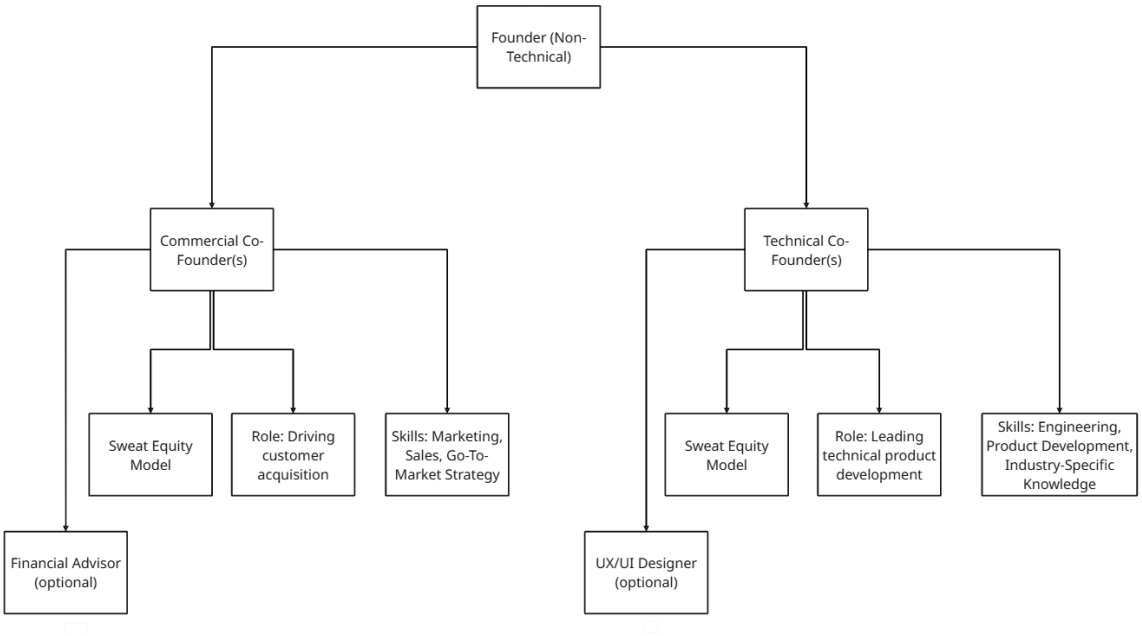


Figure 24: *Example Flowchart on the Organizational Structure Planning*

- **Recruitment Strategy:**
  Co-founders and early team members are typically engaged through sweat equity arrangements. The founder should prepare clear and compelling partnership-based job advertisements (e.g., posted on platforms like LinkedIn), clearly stating that the roles are unpaid partnerships in exchange for equity stakes.
- **Founder's Leadership Role:**
  If the founder is non-technical, strong leadership and managerial skills become essential. The founder must demonstrate the ability to articulate a vision, coordinate diverse teams, and maintain project momentum without direct technical contributions.
- **Candidate Sourcing:**
  Recruitment can be conducted through personal networks first, leveraging professional connections, followed by public postings. According to empirical insights from the case studies analyzed in this thesis, a transparent, mission-driven approach tends to attract a surprisingly large pool of motivated candidates even at the unpaid stage.

Tools and Deliverables:

- Role Matrix (listing skill gaps and desired profiles)
- Partnership-Based Job Advertisements (for LinkedIn or similar platforms)

Duration:

- **Initial Structuring and Job Postings:** 2 weeks.
- **Recruitment and Onboarding Process:** Ongoing (runs parallel to subsequent steps).

Integration with Track B (Product & Service Development):

Recruiting the right team members early is essential for parallel progress in the product

development track. Technical and marketing co-founders are particularly crucial to translate the initial hypotheses and product sketches into functional prototypes and initial go-to-market activities.

7.3.9 Branding & Digital Presence

To create a compelling, cohesive brand identity that reflects the startup's value proposition and appeals directly to the target audience identified through market research. Branding plays a vital role in establishing early trust and legitimacy, especially for startups in traditionally conservative industries like ConTech. For an applied example of this step, see Appendix A.2.9 (Permitt.ai Implementation).

Key Actions:

- Translate customer research and business positioning into a visual and verbal identity.
- Hire a designer or agency to develop core assets, including logo, colors, and typography.
- Define the tone of voice and language style aligned with the user profile.

Tools & Deliverables:

- Brand board (logo, color palette, typography, iconography)
- Brand voice/tone document
- Sample marketing visuals and social media templates
- Optional: Audio branding elements for digital platforms

Duration: ~2 weeks, however, this step can be faster depending on team capacity and clarity of research insights.

Integration with Track B:
The branding output must reflect insights gained during early product sketching and UI/UX planning (Track B). This alignment ensures consistency across all customer touchpoints.

7.3.10 Website & Social Media Launch

To establish a credible online presence that showcases the startup's mission, brand identity, and early value proposition, even before the product is finalized. A professional digital presence is essential for building trust with future team members, investors, and early adopters. For an applied example of this step, see Appendix A.2.10 (Permitt.ai Implementation).

Key Actions:

- Develop a basic but professional website that communicates the startup's vision, brand identity, and planned offering.
- Include key sections: About, Vision/Mission, Early Product Teasers, Contact Information.
- Launch initial social media pages (LinkedIn, Instagram, and others based on audience) to reinforce visibility and legitimacy.
- Repurpose branding assets (logo, colors, sample posts) created during the branding phase for use on the website and social channels.
- Create and publish a small batch of designed posts and short-form content (e.g., introductory reels, teaser updates).

Tools & Deliverables:

- Website (landing page or small multi-section site)
- Social media profiles set up and customized
- 5–10 visual posts or reels aligned with the brand guidelines
- Integration of social links on the website for cross-channel trust signals

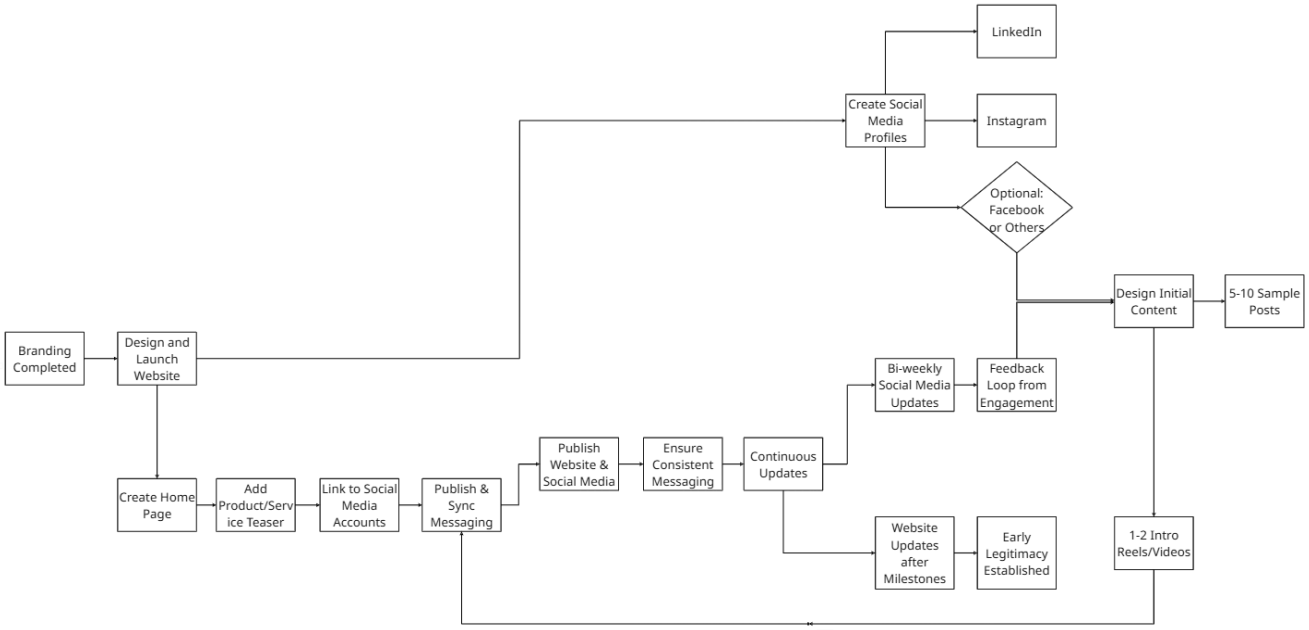


Figure 25: *Example Flowchart on the Website & Social Media Launch Planning*

Duration: ~2–3 weeks (often parallel with the end of branding activities)

Integration with Track B:
The website and social media messaging must be consistent with Track B's product/service sketches. Even if the product is still conceptual, messaging should project confidence about the problem being solved and future plans.

7.4 Track B: Product & Service Development

Track B focuses on the systematic development of the startup's product or service offering. It runs in parallel to Track A (Business Formation & Operations) from the earliest stages, ensuring that the market and business insights uncovered in Track A are directly reflected in the evolving product vision.

While the steps are presented sequentially for clarity, real-world startup execution often blends these phases, with continual iteration driven by user feedback and operational realities. The goal of Track B is not to achieve a polished final product immediately, but to create tangible outputs, such as sketches, mockups, MVPs, that facilitate user validation, guide team alignment, and support fundraising efforts.

Each subsection below outlines the objective, methods, integration with Track A, and key insights derived from the empirical cases *(see figure 26 below)*.

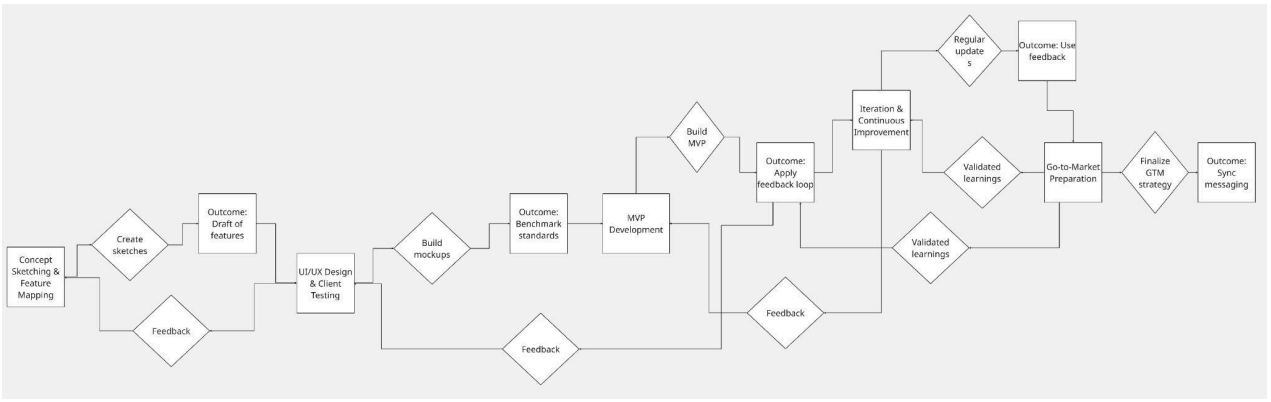


Figure 26: *Example Flowchart on the Product & Service Development steps*

7.4.1 Concept Sketching & Feature Mapping

The Concept Sketching & Feature Mapping stage seeks to externalize the venture's early business hypotheses as tangible product artefacts, facilitating rapid exploration of design alternatives and ensuring alignment between user needs, brand promise, and technical feasibility. For an applied example of this step, see Appendix A.3.1 (Permitt.ai Implementation).

Core Actions:

- **Sketch core interactions.** Produce low-fidelity paper or digital sketches that capture the founder's vision without concern for visual detail.
- **Map features to user journeys.** Identify key functionalities based on hypothesized customer needs and pain points, then trace initial user flows to uncover gaps, redundancies, or undue complexity.
- **Define the minimum feature set.** Determine the smallest combination of features necessary to test fundamental value propositions with early adopters, in keeping with the Minimum Viable Product mindset.

Tools & Techniques:

- Paper sketches or basic Figma wireframes
- Feature-prioritization matrix

Integration with Track A:
Outcomes from concept sketching and feature mapping directly inform the Business Model Canvas inputs, shape the nascent branding direction by clarifying the product's promise, and provide concrete artefacts for subsequent UI/UX design and marketing messaging.

7.4.2 UI/UX Design & Client Testing

The UI/UX Design & Client Testing stage applies a professional design layer to the validated concept, produces interactive prototypes for evaluation, and systematically refines the interface

based on empirical feedback. By benchmarking against competitor standards and engaging an early user cohort, this phase ensures both usability and desirability are rigorously assessed before wider rollout. For an applied example of this step, see Appendix A.3.2 (Permitt.ai Implementation).

Core Actions:

- **Develop mockups and prototypes.** Produce low- to mid-fidelity mockups and interactive prototypes in Figma or Adobe XD, translating paper sketches into tangible interfaces.
- **Benchmark design standards.** Evaluate proposed layouts and interaction patterns against competitor offerings to minimize user learning curves and adhere to industry conventions.
- **Conduct usability and desirability tests.** Execute moderated usability interviews and click-through tests with the early user pool identified in Track A, capturing both qualitative insights and quantitative metrics.

Tools & Techniques:

- Figma, Adobe XD for design and prototyping
- Miro for mapping user journeys
- Usability interviews and click-through tests for feedback collection

Integration with Track A:
Outcomes from this phase reinforce the primary research and competitive analysis conducted earlier, ensuring that design decisions are grounded in validated user needs. The visual artifacts produced here inform branding guidelines and digital-presence strategies, while usability findings guide subsequent feature prioritization and iterative refinement.

7.4.3 MVP Development

The MVP Development stage aims to deliver a stripped-down version of the product that still allows testing the key assumptions with real users (Ries, 2011). By moving quickly through focused experiments, then learn what matters most before investing in additional features. For an applied example of this step, see Appendix A.3.3 (Permitt.ai Implementation).

Core Action:

- **Build a basic, testable version.**
  Create a working prototype or minimal service that targets the primary hypothesis. Whenever possible, use no-code tools (Bubble, Webflow) to speed delivery; otherwise, have the technical co-founders implement just the essentials in lightweight code.
- **Concentrate on one key user problem.**
  Pick the single pain point whose resolution will give the clearest insight into market demand. Postpone any “nice-to-have” features until validating that core assumption.

- **Follow the Build–Measure–Learn cycle.**
  1. **Build:** Assembling the simplest version of the solution.
  2. **Measure:** Gathering user feedback and usage data, this might include a quick landing-page smoke test or short interviews.

3. **Learn:** Reviewing what's found, confirm or refute the assumptions, and feed those insights into the next iteration.

Tools & Techniques:

- Bubble or Webflow (no-code rapid prototyping)
- Lightweight custom development by early technical co-founders
- Landing-page smoke tests to gauge interest before full build

Integration with Track A:

Results from these MVP experiments directly shape the fundraising narrative and go-to-market plan. At every step, confirm that what has been built still aligns with the business model and customer profiles defined earlier.

7.4.4 Iteration & Continuous Improvement

The Iteration & Continuous Improvement stage embeds systematic feedback and agile practices into the startup's development cycle, ensuring that product enhancements remain closely aligned with user needs and market realities.

Core Actions:

- **Analyze performance and feedback.**
  Systematically review MVP usage data and qualitative input to identify strengths, weaknesses, and opportunities for refinement.
- **Plan and prioritize updates.**
  Translate insights into a roadmap of feature enhancements and optimizations, balancing customer impact against development effort.
- **Sustain user engagement.**
  Continue scheduled interviews and usability tests post-launch to validate improvements and surface new requirements.

Tools & Techniques:

- Customer interviews and surveys
- Analytics tracking platforms (e.g., Mixpanel, Hotjar)
- Agile sprint planning and backlog management

Integration with Track A:

Feedback loops inform ongoing revisions to the Business Model and strategic planning, while iteration outcomes shape updates to go-to-market tactics and investor communications.

7.4.5 Go-to-Market Preparation

This stage transitions the venture from internal development to external market engagement, establishing coherent messaging, campaign structures, and customer-acquisition strategies. Building on Track A research and brand foundations, the go-to-market (GTM) preparation phase ensures that all outreach efforts reflect validated insights into target customers and competitive positioning.

Blueprint Steps:

- **Finalize the GTM strategy.**
  Integrate primary research findings, competitive analysis, and brand positioning to define clear value propositions, pricing models, and distribution channels.
- **Design launch campaigns and funnels.**
  Develop marketing collateral, outline customer onboarding sequences, and establish early success metrics, such as activation rates and churn indicators, to monitor performance.
- **Align digital and social presence.**
  Update website content, social-media profiles, and brand storytelling elements to reflect the product's core messaging and ensure a unified brand voice across touchpoints.

Tools & Techniques:

- CRM platforms (HubSpot, Pipedrive) for lead management and pipeline tracking
- Email-marketing services (Mailchimp, Brevo) for segmented outreach and drip campaigns
- Project-management or timeline-planning tools (e.g., Gantt charts) to coordinate launch activities

Integration with Track A:

- GTM tactics are calibrated against the branding, pricing, and positioning frameworks established earlier, ensuring strategic consistency.
- Selected acquisition channels and campaign approaches directly derive from validated customer profiles and user-journey insights produced in Track A.

7.5 Embedded: Fundraising Strategy (Within Both Tracks)

In the refined ConTech startup blueprint, fundraising is not treated as a separate, standalone activity. Instead, it is strategically embedded within the progression of Track A (Business Formation & Operations) and Track B (Product & Service Development). This approach ensures that preparation for funding evolves naturally alongside business and product readiness, increasing the startup's credibility and fundraising success rate. For an applied example of this step, see Appendix A.4 (Permitt.ai Implementation).

Fundraising activities are aligned with key milestones:

- After completion of **Financial Planning & Viability (7.3.6)**, the internal financial models, budgeting projections, and break-even analysis are used to validate the business's internal readiness for external funding conversations.
- After the development of the **Business Plan (7.3.5)** and the creation of an early **Minimum Viable Product (MVP) (7.4.3)**, founders can initiate early investor outreach, targeting appropriate funding sources that match their stage (e.g., bootstrapping, incubators, business angels, crowdfunding, startup competitions).

An effective fundraising round requires thorough preparation, ensuring that materials, data, and strategy are in place before active pitching begins. Founders should particularly focus on the following components, adapted from Kawasaki's "10-slide rule":

1. **Problem or Opportunity:** Clear articulation of the pain being alleviated or the pleasure provided, designed to emotionally engage investors.

2. **Value Proposition:** Concise explanation of the tangible value delivered to the customer.
3. **Underlying Magic:** A description (preferably visual) of the technology, approach, or "secret sauce" that differentiates the product.
4. **Business Model:** Clarification of who currently holds the customer's money and how the startup will capture it.
5. **Go-To-Market Plan:** Cost-effective strategies to reach and activate target customers.
6. **Competitive Analysis:** Honest depiction of the competitive landscape and how the startup uniquely addresses the market need.
7. **Management Team:** Introduction of core team members, even if the team is incomplete. Strengths and gaps should be acknowledged transparently.
8. **Financial Projections and Key Metrics:** Three-year forecast based on bottom-up modeling (e.g., number of customers, pricing, conversion rates).
9. **Current Status, Milestones, and Use of Funds:** Clear reporting on what has been achieved, what remains, and how raised capital will be deployed to achieve the next stage of growth.

Timing plays a critical role in fundraising success. Founders are advised to align fundraising rounds with key milestones, such as MVP launch, first customer traction, or signing key partnerships. This positioning allows the founder to present the company at a moment of positive momentum, increasing perceived value and reducing investor risk aversion.

Moreover, an investor engagement funnel should be developed, mirroring a sales funnel approach. Investors should be categorized by fit and stage (e.g., angel investors vs. early-stage VCs), and pitching meetings should be clustered closely together to create a sense of urgency (FOMO, Fear of Missing Out) among prospective investors.

A fundraising readiness checklist can be summarized as follows:

- Completed Business Plan with clear TAM/SAM/SOM analysis.
- Validated MVP or service prototype.
- Investor-grade Pitch Deck (maximum 10 focused slides).
- Clear Go-to-Market strategy with early evidence of customer interest.
- Organized Investor Funnel and prioritized outreach plan.
- Clarity on valuation expectations, investment round size, and funding usage.

Fundraising, within the context of the ConTech blueprint, is thus positioned as an embedded, milestone-driven process, not an isolated event. Proper timing, rigorous preparation, and strategic alignment with the startup's operational and product development tracks significantly increase the likelihood of securing the resources necessary for growth.

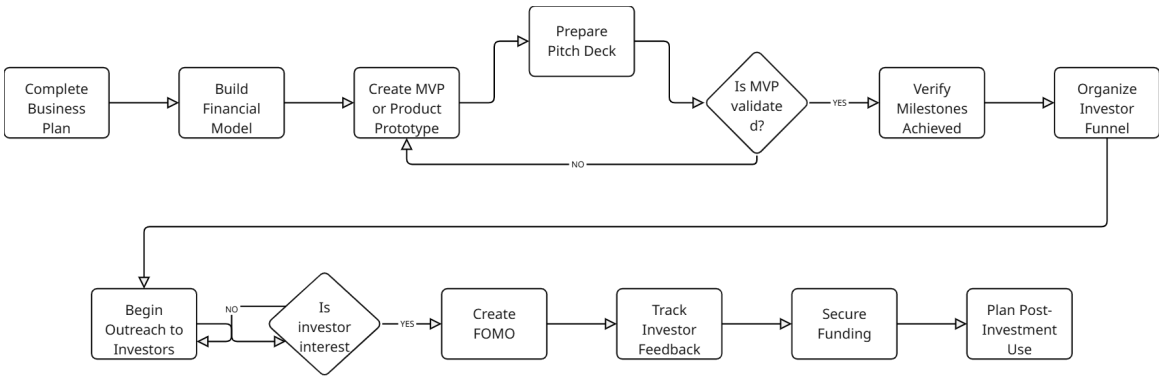


Figure 27: *Example Flowchart on the Fundraising activities*

7.6 Final Notes: Iteration, Focus, and Simplicity

While the Refined ConTech Startup Blueprint is presented in a detailed, phased manner, it is crucial to remember that startup building is, at its core, an iterative and pragmatic endeavor. The reality of startup life can be distilled into a repeating loop of four fundamental actions: build, sell, fund, and repeat. Each component of the blueprint, whether operational or product-oriented, is ultimately in service of advancing through this loop.

Founders should resist the urge to overcomplicate their journey. Perfection is neither feasible nor necessary in the early stages. Instead, focused execution, consistent validation, and strategic adaptability are what separate viable startups from those that stagnate. Whether it is testing an MVP, refining a pitch, or recalibrating the go-to-market plan based on user feedback, the principle remains the same: progress through real-world learning and measured iteration.

The blueprint provides structure, but success lies in maintaining momentum. Prioritize the essential, stay close to the customer, and use each iteration as a stepping stone toward product-market fit and long-term scalability.

8. Implementation

8.1 Applying the Blueprint

The Refined ConTech Startup Blueprint is designed not merely as a theoretical model but as a practical, actionable guide for entrepreneurs, especially civil engineers and industry professionals, seeking to build and scale successful ventures in the construction technology sector.

Civil engineers, with their technical background, often possess deep insights into industry inefficiencies, material innovations, and workflow challenges. However, translating these insights into a viable startup requires more than technical expertise; it demands a structured process for validating ideas, building operational capacity, and securing market traction.

By following the dual-track structure of the blueprint, civil engineers can systematically develop both the business foundation and the solution offering in parallel:

- **Track A: Business Formation & Operations** ensures that the startup is built on a validated need, a focused market entry strategy, and an operational structure ready for scaling.
- **Track B: Product & Service Development** guarantees that the product or service is shaped by continuous customer feedback and real-world testing rather than isolated technical assumptions.

The blueprint allows engineers to start small and iterate, minimizing the risk of overinvestment in unvalidated solutions. By using tools like the Business Model Canvas, conducting early primary research, involving future users in prototyping, and building a simple but credible digital presence, engineers can attract co-founders, partners, and even early investors long before a full product is launched.

Importantly, this structured approach empowers non-business-trained founders to progress confidently through the uncertainty of startup life, building competence in areas such as financial planning, go-to-market strategy, and fundraising, without getting overwhelmed by complexity.

8.2 Practical Considerations

Although the Refined ConTech Startup Blueprint provides a structured and actionable pathway for startup development, its successful implementation depends on several real-world factors that founders, particularly those from technical backgrounds such as civil engineering, must account for. These considerations are not exceptions to the framework, but rather contextual challenges that shape how it is applied across diverse startup environments. This section outlines the primary constraints and complexities associated with executing the blueprint in practice, particularly within the construction technology sector.

Regulatory and Compliance Constraints
One of the most significant limitations facing ConTech startups is the high degree of regulation inherent to the construction industry. Many solutions, especially those involving materials, structural systems, or environmental innovations, are subject to safety standards, municipal codes,

and multi-stage certification processes. These requirements often extend timelines and complicate market entry.

To mitigate these constraints, early engagement with industry bodies, compliance authorities, and certification pathways is essential. This engagement should begin during the market research phase and be maintained throughout the product development cycle to avoid unforeseen regulatory setbacks.

Extended Sales and Adoption Cycles
Unlike consumer-facing technology startups, ConTech ventures frequently operate in B2B environments with long decision-making horizons. Sales cycles may span several months due to procurement procedures, project-based budgeting, and the hierarchical nature of client organizations. This dynamic affects not only revenue projections but also feedback loops critical to iterative development.

To address this, startups should aim to establish early dialogues with stakeholders and decision-makers during the user research phase (Track A) and maintain these relationships through ongoing updates and pilot collaborations. These relationships serve both as validation sources and potential early adopters.

Skillset Asymmetries and Team Limitations
Founders emerging from engineering or research domains may possess deep technical expertise but lack familiarity with business development, marketing, legal structuring, and financial planning. This imbalance can hinder execution, particularly during the business formation phases and go-to-market planning.

In such cases, the emphasis should be placed on assembling a complementary founding team and clearly defining responsibilities through early organizational planning (see Section 7.3.8). The use of sweat equity and well-structured job postings, particularly those targeting motivated professionals seeking to join early-stage ventures, can partially offset financial constraints.

Product Development Constraints: Hardware vs. Software
Product timelines in ConTech differ markedly based on whether the solution is software-based or hardware/material-oriented. While digital platforms can often be iterated quickly, hardware solutions typically require longer development, testing, and certification cycles. As such, time-to-market expectations must be carefully calibrated.

This challenge underscores the importance of separating the product vision (Track B) from immediate MVP deliverables. In hardware-heavy contexts, founders may benefit from partnerships with academic labs, prototyping firms, or third-party testers to compress validation cycles without compromising product integrity.

Financial Limitations and Investor Readiness
Resource constraints are a defining feature of early-stage startups, and ConTech ventures, often capital-intensive, are particularly affected. While the blueprint outlines a clear process for

fundraising preparation (see Section 7.5), the ability to secure capital hinges on delivering strong signals of traction and feasibility.

This requires not only a well-prepared pitch and supporting documentation but also careful timing of investor engagement relative to key development milestones (e.g., after MVP testing or publication of validated market data). Investors in this domain often value real-world traction over theoretical potential.

Risk of Strategic Diffusion

Finally, one of the less visible but recurring risks in early-stage startup development is the dilution of focus. Founders, especially in response to stakeholder feedback, may feel compelled to expand their scope prematurely or pivot frequently.

The blueprint seeks to minimize this by establishing strong grounding in user research, market definition, and iterative validation. However, maintaining focus requires discipline, clear decision-making criteria, and a continual return to the hypotheses defined in the ideation phase.

9. Discussion & Conclusion

This chapter synthesizes the findings from both the theoretical analysis and empirical interviews presented in the earlier chapters. It outlines the broader implications of the research for the construction technology (ConTech) sector and for startup methodology at large. The section also addresses how this study contributes to entrepreneurial practice within the construction industry and concludes by identifying areas for future research.

9.1 Key Insights

The central insight of this thesis is that existing startup methodologies, while foundational and widely used, are not fully equipped to address the practical realities of launching and scaling a ConTech startup. Methodologies such as *The Lean Startup*, *The Startup Owner's Manual*, and *Disciplined Entrepreneurship* offer valuable tools for product development, customer validation, and iteration. However, when applied to ConTech ventures, they often fall short in areas such as regulatory compliance, operational planning, hardware prototyping, and industry-specific sales cycles.

Empirical insights from interviews with founders, investors, and industry experts, including CEO 1, Angel Investor 1, CEO 2, Angel Investor 2, Management Consultant 1, and Business Developer 1, highlighted that many startup founders in this space are non-technical entrepreneurs or domain experts without software development backgrounds. These individuals require a blueprint that supports not only product validation but also legal setup, team formation, funding strategy, and regulatory navigation, all of which must run in parallel with the core business and product development activities.

The refined blueprint developed through this thesis reflects this reality. It introduces a dual-track approach that structures the startup journey around (1) business formation and operations and (2) product/service development. The framework's modularity, emphasis on iteration, and incorporation of fundraising readiness mark a key advancement in adapting entrepreneurial methodologies to ConTech's specific demands.

9.2 Contributions to the Industry

This thesis aims to contribute to both academic literature and industry practice in several ways. First, it fills a methodological gap by proposing a domain-specific blueprint tailored to the unique constraints of the construction technology sector. Unlike general startup frameworks, the refined blueprint accounts for the physicality of ConTech products, the fragmented structure of the construction industry, and the importance of long-term stakeholder trust.

Second, it democratizes startup knowledge for civil engineers and other technical professionals who may lack formal training in entrepreneurship. By framing the startup process in familiar, structured terms, while offering accessible tools such as the Business Model Canvas, user research workflows, and iterative MVP testing, it aims to lower the barrier to entry for innovation-driven founders within the industry.

Finally, the research offers a roadmap for entrepreneurial support organizations, incubators, and university programs that wish to develop more nuanced training and support mechanisms for ConTech founders. By providing a visual, step-by-step framework with real-world case validation, the blueprint becomes a practical guide for both solo founders and teams navigating the early stages of company formation.

9.3 Problematisations and Contextual Considerations of the Proposed Framework

While the proposed blueprint offers a structured guide, its effective application requires critically examining its limitations. No framework is universally applicable, and acknowledging its potential pitfalls enhances its utility by fostering adaptability.

Key application pitfalls include the risk of over-rigidity, where founders follow steps too literally and miss opportunistic pivots; the resource intensity of certain phases, which may challenge bootstrapped ventures; and the unavoidable influence of founder bias in interpreting market signals.

The framework also has inherent shortcomings. Its empirical basis in the Nordic, software-centric ConTech ecosystem may limit its generalizability to hardware-focused ventures or different global regions. The rapid evolution of technology in ConTech (ZACUA Ventures, 2025) means the framework itself will require periodic updates to maintain relevance. Furthermore, it provides less detailed guidance on scaling operations post-MVP compared to its focus on early-stage formation.

Finally, the blueprint's relevance is highly dependent on context. Geographically, strategies must adapt to local investor expectations and regulations. The framework serves software ventures well, but deep-tech or hardware startups face different R&D cycles. Its utility will also shift over time with new technologies, evolving investor sentiment, and changing regulations.

Moreover, the proposed blueprint should be used as an adaptable guide, not an inflexible dogma. Its effective application requires that founders critically assess its components against their specific venture, context, and the evolving industry landscape, ensuring a resilient and successful approach.

9.4 Future Research

While this thesis presents a comprehensive startup blueprint grounded in empirical research and methodological critique, several avenues remain open for further investigation.

First, future studies could explore the longitudinal application of the proposed blueprint by tracking ConTech startups over time. This would allow for the evaluation of its long-term effectiveness in improving founder decision-making, reducing time to market, or increasing fundraising success.

Second, quantitative studies could complement the qualitative approach used here. By surveying a broader pool of startups in the construction sector, researchers could measure the correlation between specific blueprint steps (e.g., early customer validation, team formation timing) and startup outcomes (e.g., funding raised, user retention, scalability).

Third, the blueprint could be tested in adjacent sectors that share characteristics with ConTech, such as clean tech, manufacturing, or industrial IoT. These industries often involve similar challenges

related to physical products, compliance requirements, and legacy infrastructure. Adapting the blueprint to those domains could extend its impact and validate its cross-sector relevance.

Finally, future work could examine how policy frameworks, funding ecosystems, and educational curricula can better support domain experts, such as civil engineers, in becoming high-impact entrepreneurs. Understanding the broader ecosystemic enablers could unlock new pathways for innovation in historically conservative industries.

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Appendix A: Application of the Refined Blueprint – Case Study: Permitt.ai

A.1 Overview of Permitt.ai

Permitt.ai is a Swedish ConTech startup that was founded and developed in parallel with this thesis as a real-world application of the Refined ConTech Startup Blueprint. The startup addresses the inefficiencies in the Swedish building permit process by offering AI-powered blueprint generation and permit packages for small-scale construction and renovation projects.

Initially launched by two architects, the team successfully followed the steps outlined in the blueprint—starting with ideation, hypothesis framing, market and user research, and competitive analysis. Through clear branding, a compelling business model, and early validation, the founders were able to attract a machine learning engineer and a full stack developer to join the team.

The startup now offers two main pricing tiers (Standard and Premium Packages), with value propositions based on speed, compliance, and transparent pricing. As of this writing, the team has completed product testing and is preparing for public launch.

A.2 Applying Track A – Business Formation & Operations

A.2.1 Ideation & Hypothesis Framing

In the first week of developing Permitt.ai, the founding team initiated the ideation process by completing a Business Model Canvas (see Figure A1). This exercise helped condense the founders' vision, initial assumptions, and business concept into a single-page strategic blueprint. Following this, a structured hypothesis framework was established to guide the research and validation process (see Figure A2).

The following hypotheses were formulated to address key unknowns across user needs, market feasibility, and business model assumptions:

User-Centered Hypotheses – Property Owners

- **H1**: Property owners face significant pain points in the building permit process, including high costs, long timelines, and administrative complexity.
- **H2**: Property owners are willing to pay for an AI-powered permit solution if it demonstrably reduces costs and approval time.
- **H3**: Digital marketing campaigns can effectively reach and engage property owners as potential users.

User-Centered Hypotheses – Architects and Entrepreneurs

- **H4**: Architects and architectural firms experience permit-related challenges and are open to solutions that streamline the application process.
- **H5**: Architects are interested in using or referring clients to an AI-based solution that facilitates faster, more accurate permit applications.

- **H6**: Architects prefer specific communication channels for discovering and adopting new tools.

Target Market and Business Model Hypotheses

- **H7**: Either property owners or architects will emerge as the more viable and profitable primary target audience.
- **H8**: A pricing model based on square meter rates or a subscription plan will align with the expectations and purchasing behavior of the target segment.

Market & Competitive Hypotheses

- **H9**: Existing competitors offer partial solutions that leave notable gaps in affordability, speed, or usability—areas where Permitt.ai can differentiate.

Partnership and Feasibility Hypotheses

- **H10**: Key ecosystem stakeholders, such as regulatory authorities and data providers, will be open to partnerships and data-sharing arrangements.
- **H11**: The market size is sufficient to support a sustainable business model for an AI-powered permit solution.
- **H12**: Development and AI infrastructure costs can be contained within a reasonable budget to ensure financial viability.

These hypotheses formed the foundation for the subsequent phases of market research, user interviews, solution design, and value proposition refinement. The structured and hypothesis-driven approach reflects the methodology proposed in the Refined ConTech Startup Blueprint.

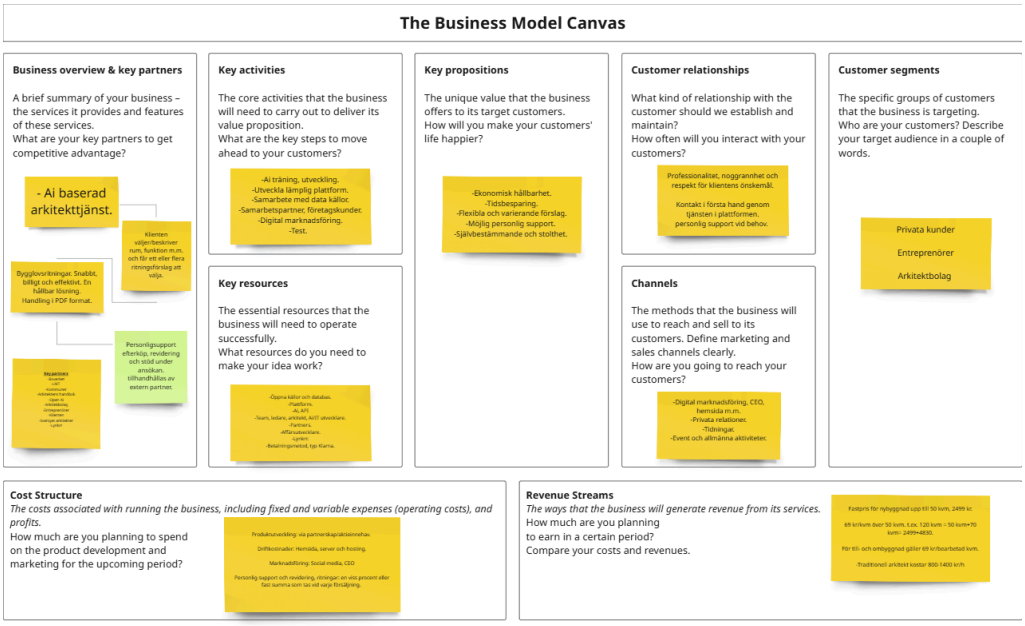

Figure A.1: *Permitt.ai Business Model Canvas (Hani Alsayah, 2024)*

Figure A.2: *Permit.ai Hypothesis map (Hani Alsayah, 2024)*

A.2.2 Identifying the Need (Primary & Secondary Research)

Following the hypothesis framing, the Permitt.ai team proceeded to validate the problem-solution fit through a structured needs assessment phase. This stage aimed to test whether the pain points, customer interest, and market dynamics aligned with the proposed solution, or if the concept required modification to meet actual demand.

To test hypotheses **H1**, **H2**, and **H3**, centered on property owners, the team launched a digital survey targeting this user group. The survey was distributed via a paid social media campaign and incentivized with a **500 SEK gift card** raffle for one randomly selected respondent (See Figure A3 below). The campaign clearly communicated the unique selling proposition (USP) of Permitt.ai, emphasizing speed, simplicity, and AI-enhanced permit application support. This approach ensured that responses came from a relevant and engaged subset of potential users (See Figure A4 below).

Figure A3 Permitt.ai Digtial survey campaign (Permitt social media (dec,2024))

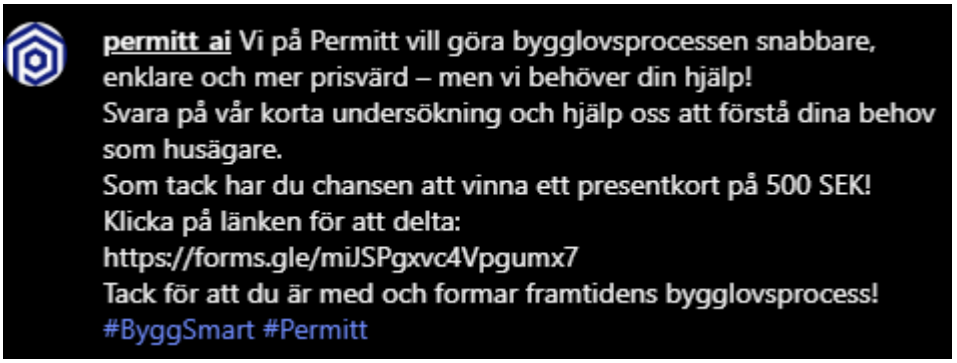

Figure A4 Permitt.ai Digtial survey campaign (Permitt social media (dec,2024))

Simultaneously, to address hypotheses **H4**, **H5**, and **H6**, the team conducted ten qualitative interviews with architects and professionals in the built environment. The interviewees were selected from a national registry of practicing architects provided by the municipality of Mark in Västra Götaland. Outreach was conducted via personalized email invitations, and interviews were

structured to explore current challenges in the permitting process, attitudes toward new digital tools, and preferred communication channels for professional software adoption.

In parallel, the founder carried out an extensive secondary research effort. This desk-based study examined:

- The current building permit process in Sweden.
- Typical application timelines, bottlenecks, and approval procedures.
- Existing tools and platforms used by property owners and architects.
- User feedback on these platforms and their perceived limitations.
- Trends in AI adoption within municipal permitting and urban planning.

This combined primary and secondary research phase spanned approximately two weeks and provided a comprehensive understanding of the pain points experienced by both customer segments. The insights gained were instrumental in validating the core hypotheses and further refining the user profile, market assumptions, and strategic positioning of Permitt.ai.

This allowed the founders to initiate the sketching process for their platform vision, effectively bridging the insights from Track A with the product development activities outlined in Track B of the blueprint.

A.2.3 Competitive & Pricing Analysis

Following the completion of initial customer research, the founders of Permitt.ai turned their focus to a structured competitive analysis in order to validate their positioning and identify opportunities for differentiation. The process began by mapping out the competitive landscape based on the initial assumption that competitors could be segmented by their target audiences: (1) architects and contractors, (2) property owners, and (3) mixed B2B/B2C models. This segmentation was later revised when the team discovered that many competitors could not be defined solely by their audience focus but rather by the technological approach behind their offerings.

As a result, the team restructured their competitor classification into three more relevant categories:

- AI-Based Solutions
- Hybrid Solutions (AI + Human Involvement)
- Traditional Consultancies

Once the classification was refined, the founders compiled a comprehensive list of relevant competitors and began profiling them in terms of features, unique selling propositions (USPs), pricing models, target users, and public feedback. They explored customer reviews, case studies, and, where possible, tested available solutions to gain practical insights. Among these, Maket.ai stood out as a key benchmark, offering an advanced AI-driven architectural tool that inspired the Permitt.ai team to set higher expectations for their own platform.

This hands-on evaluation process helped the team define clear points of differentiation, refine their value proposition, and make more informed decisions about their MVP structure. These findings

directly influenced the next step in the blueprint, early product sketching, by feeding into the visual design process using collaborative platforms such as MIRO.

A.2.4 Market Sizing & Opportunity Validation

Following the identification of the target audience and completion of the competitive analysis, the founders of Permitt.ai proceeded to assess the market potential of their solution through a structured, multi-step process (see Figure A5 below). This phase was crucial for validating the commercial viability of the business model and for quantifying the scale of the opportunity within both national and European markets, this step however took approximately 1.5 weeks.

The process began with the consolidation and analysis of qualitative and quantitative insights gathered during earlier phases. Survey responses and interview transcripts were reviewed to extract core patterns related to user demand, pain points, and willingness to pay.

Based on this analysis, the team constructed a detailed customer persona, representing the segment of users with the strongest need for the platform. This persona served as the reference point for the subsequent market sizing calculations.

To define the Total Addressable Market (TAM), Serviceable Available Market (SAM), and Serviceable Obtainable Market (SOM), the founders gathered data from public sources, including government statistics and European construction datasets. The personas were matched to real population segments, enabling the following estimates:

- TAM (EU-wide potential users):
  4.9 million users × 5,000 SEK = 2.45 billion SEK
- SAM (Swedish potential users):
  102,900 users × 5,000 SEK = 514.5 million SEK
- SOM (5% of SAM):
  5,145 users × 5,000 SEK = 25.7 million SEK

In parallel, the team finalized their initial feature list, guided by three key questions:

1. What does the competition offer, and what is missing?
2. What unique value can Permitt.ai introduce?
3. What does the complete feature set look like, including a visual or conceptual example?

This led to the formulation of a coherent and differentiated product scope.

Lastly, the team evaluated pricing models by benchmarking competitor prices against their own projected offering. They aligned the price point with the value provided and the market's expectations, ensuring that the platform remains attractive and competitive.

This market sizing exercise not only confirmed the business opportunity but also served as the foundation for future investment discussions and go-to-market planning.

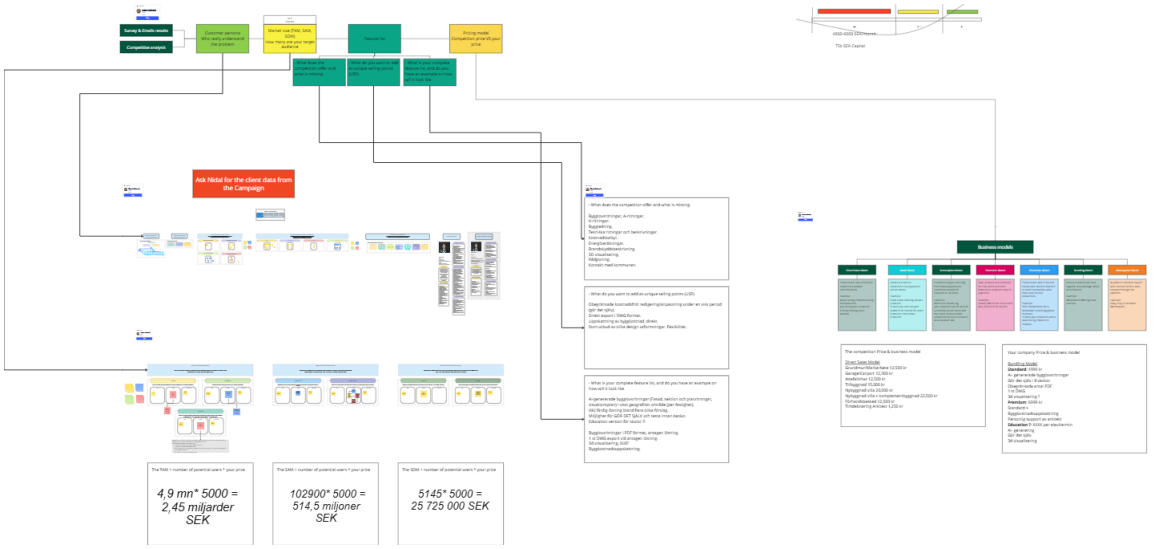

Figure A5 Permitt.ai Market Sizing & Opportunity Validation (Hani Alsayah, 2025)

A.2.5 Business Plan Development

After completing the key validation and research phases, the Permitt.ai team dedicated an additional week to synthesizing their findings into a structured business plan. This document served as a strategic blueprint that brought together insights from ideation, market research, competitive analysis, and market sizing, and translated them into a coherent go-to-market and operational strategy.

The business plan included the following core components:

- **Executive Summary:** A high-level overview of the concept, market potential, and unique value proposition.
- **Business Description:** Explanation of the platform's core offering, vision, and mission.
- **Core Values:** The principles guiding the startup's development and stakeholder engagement.
- **Market Analysis:** Summary of industry challenges and market trends relevant to AI-driven permitting solutions.
- **Market Size:** Calculation of TAM, SAM, and SOM based on primary and secondary research.
- **Target Market Characteristics:** Description of the ideal customer segment, including demographics and behaviors.
- **Customer Persona:** A detailed profile reflecting real-world insights from surveys and interviews.
- **Value Proposition & Key Benefits:** A clear articulation of what makes Permitt.ai valuable and distinct.
- **Competitive Analysis:** In-depth review of direct and indirect competitors, with a breakdown by solution type (AI, hybrid, traditional).
- **Competitive Edge:** Key differentiators that position Permitt.ai favorably in the market.

- **Product & Service Packages:** Definition of feature tiers and pricing:
    - *Standard Package (4,999 SEK)*
    - *Premium Package (6,999 SEK)*
    - *Additional Offerings* tailored to user needs
- **Sales & Marketing Strategy:** Channels, messaging approach, and customer acquisition tactics based on the findings from Track A.
- **Operations Plan:** Breakdown of activities for development, launch, and growth phases.
- **Management Team:** Overview of current team capabilities and roles, as well as key talent needs.
- **Financial Plan:** Initial budgeting assumptions, projected revenue scenarios, and foundational cost structure.

This comprehensive document marked the conclusion of the first track in the blueprint, establishing a validated, market-aligned business concept. The plan was later used as a basis for early investor discussions and internal roadmap planning, solidifying Permitt.ai's readiness for development and launch.

A.2.6 Financial Planning & Viability

Following the business plan development, the Permitt.ai team dedicated an additional two weeks to laying the foundation for the startup's financial strategy. Given the early stage of development, the financial planning process focused on creating a baseline understanding of operational costs and revenue potential rather than producing precise forecasts. These financial models were developed to support internal decision-making, investor communication, and MVP-phase planning, while recognizing the inherent uncertainty at this stage.

Key components of the financial planning process included:

- Preliminary Budgeting: The team outlined an estimated budget covering anticipated expenses across core areas such as product development, marketing, legal and administrative costs, and operational overhead for the first 12 to 18 months.
- Three-Year Financial Projections: Projections were created using data from prior market sizing efforts. Revenue estimates were based on TAM, SAM, and SOM calculations, combined with initial pricing models and assumptions about user acquisition through the proposed go-to-market strategy.
- Break-Even Analysis: A simplified break-even model was developed to estimate the minimum number of paid transactions or customer acquisitions required to cover monthly operating expenses.
- Scenario-Based Planning for MVP Phase: To guide early-stage financial decision-making and assess risk exposure, the founders constructed multiple financial scenarios—best-case, expected-case, and worst-case—based on different adoption and cost trajectories for the MVP.

While the models were not intended as definitive forecasts, they served as a practical tool to validate the economic potential of the business model and assess the viability of launching a capital-efficient ConTech platform under uncertain early-stage conditions.

A.2.7 Legal Setup & Registration

The legal setup for Permitt.ai was executed in close alignment with the framework proposed in this thesis, demonstrating the practical applicability of the recommended approach. Due to thorough preparation during the earlier stages—including comprehensive business planning, financial projections, and market validation—the legal registration process proceeded efficiently and without major setbacks.

The legal formation followed a standard Aktiebolag (AB) incorporation process in Sweden and consisted of the following sequential steps:

- Bank Account Setup: The initial requirement was to establish a business bank account and deposit the minimum share capital. This process took approximately 10 days.
- Company Registration (Bolagsverket): Once the capital was deposited, the company registration was filed with Bolagsverket. The registration process was completed within two weeks.
- Tax Registration (F-skatt): After receiving the organizational number, the founders applied for F-skatt (corporate tax approval), VAT registration (Moms), and employer registration (Arbetsgivare). This final phase of the legal setup took approximately four weeks.

Importantly, this step was handled asynchronously, as advised in the blueprint. While waiting for the administrative processes to be completed, the founders advanced other key tasks in parallel—particularly team building, user interface development, and brand identity work. This allowed the startup to maintain momentum and minimize downtime during the incorporation period.

A.2.8 Team Building

For Permitt.ai, team formation followed a structured and intentional approach. The founders began by drafting an initial organizational structure to define the roles and skill sets required to develop the platform and bring the product to market (see Figure A6). This included outlining responsibilities in both product development and go-to-market strategy.

Based on this structure, the founders created detailed job descriptions for the most critical roles and published recruitment posts on the company's official LinkedIn page. The recruitment effort generated a high volume of applications, which were then screened through a three-step interview process: an initial phone screening, a short virtual interview, and a final extended interview to assess technical fit and entrepreneurial mindset.

As a result of this process, Permitt onboarded a full-stack developer and an ML/AI engineer. These individuals were selected based not only on their technical capabilities but also on their alignment with the startup's vision and commitment to its long-term success. Both engineers joined the

company as co-owners and partners, receiving ownership shares through sweat equity arrangements.

This structured yet agile recruitment approach allowed the startup to rapidly build a capable and mission-aligned core team without the need for upfront salary expenses.

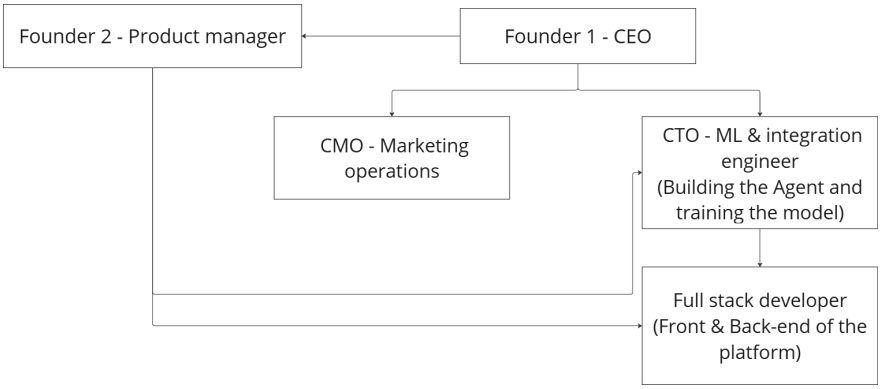

Figure A6 Permitt.ai Orgnisational structure (Hani Alsayah, 2025)

A.2.9 Branding & Digital Presence

Following the completion of their business plan and the definition of their customer persona and target market, the founders of Permitt.ai proceeded to develop the startup's branding and digital identity. This phase aimed to translate the company's core value proposition into a compelling visual and verbal language capable of resonating with the identified audience.

To support this process, the team collaborated with Lynkrr AB, a venture studio specializing in startup development. Drawing on the research and insights generated during earlier blueprint steps, particularly market segmentation, user profiling, and competitive positioning, the design team crafted a cohesive brand identity tailored to the expectations and preferences of the target user group.

The branding deliverables included the creation of a logo, a color palette, typography guidelines, and the tone of voice for both digital and print communication. These assets were strategically aligned with the needs of Permitt.ai's niche market, which consists largely of property owners and architects navigating regulatory complexity.

The resulting brand identity effectively supports early marketing efforts, enhances user trust, and lays the foundation for a consistent digital presence across channels. (See Figure A7 for the brand overview.)

Figure A7 Permitt.ai Brand identity overview (Hani Alsayah, 2025)

A.2.10 Website & Social Media Launch

Following the completion of the branding phase, the founders initiated the digital rollout of Permitt.ai by establishing an initial web presence and social media activity. This step was strategically aimed at enhancing the startup's visibility, building legitimacy, and attracting early adopters, partners, and potential collaborators.

To execute this step, the team partnered with Lynkrr AB, which supported the development of the startup's landing pages: www.permitt.ai. This website was designed to reflect the brand identity developed in the previous stage and to communicate the value proposition clearly to the target audience. They serve as the primary digital touchpoints for property owners and architects interested in exploring AI-powered permit solutions.

In parallel, the founders launched official social media channels to begin engaging with the market and to document the startup's journey. These channels also serve as communication platforms for future product updates, surveys, and beta testing initiatives. Early digital visibility plays a key role in establishing credibility, especially in a B2B context where trust and professionalism are critical to user conversion and partnership formation.

A.3 Applying Track B – Product & Service Development

A.3.1 Concept Sketching & Feature Mapping

The concept sketching process for Permitt.ai began early in the startup journey, initiated directly after the completion of the Business Model Canvas. This early step enabled the founders to visually translate their hypotheses and ideas into a structured representation of the platform's core

functionality. The first visual concept was created using Miro and focused on outlining the startup's key features and service logic (see Figure A8).

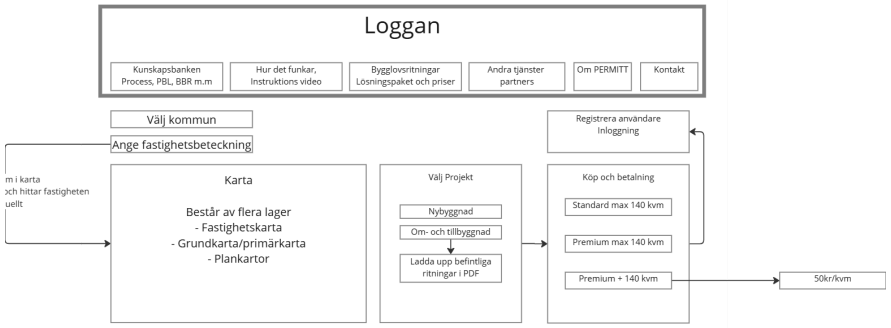

Figure A8 Permitt.ai concept sketches (Hani Alsayah, 2025)

As the competitive analysis progressed, the team identified a particularly relevant benchmark in the Canadian startup Maket. Through a detailed exploration of Maket's platform, the founders collected reference screenshots and interface flows (see Figure A9), which provided inspiration and guided the refinement of their own concept. This competitive insight served as a bridge between hypothesis formation and UI/UX planning, anchoring Permitt.ai's feature map in both market needs and proven interface practices.

This step was essential not only for clarifying the product vision but also for aligning all team members and external partners on the functional direction of the platform before advancing to design and development.

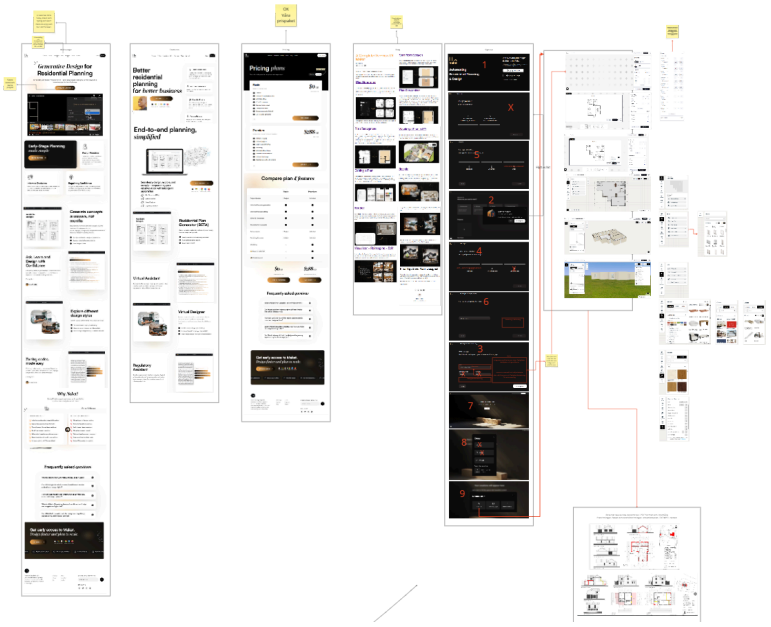

Figure A9 Permitt.ai comparison to existing solutions maket.ai (Hani Alsayah, 2025)

A.3.2 UI/UX Design & Testing

Following the completion of foundational business research and preliminary financial planning, the founders of Permitt.ai initiated the user interface and user experience (UI/UX) design process. To ensure alignment between functionality, branding, and user expectations, the team partnered with Lynkrr AB, a venture studio supporting early-stage startups, in developing the initial interface for the platform's MVP (see Figure A10).

The UI/UX design phase served as a critical transition from conceptual sketches to a more refined, user-facing representation of the product. The visual design aimed to reflect the insights gathered during earlier steps, particularly the research on user pain points, customer personas, and competitive offerings. While this process was time-intensive, it ran concurrently with team-building efforts, allowing the startup to progress across multiple fronts without delaying development milestones.

This integrated approach ensured that the visual identity and interface logic remained closely tied to the startup's strategic goals and user validation feedback. The output from this stage directly fed into the MVP development workflow.

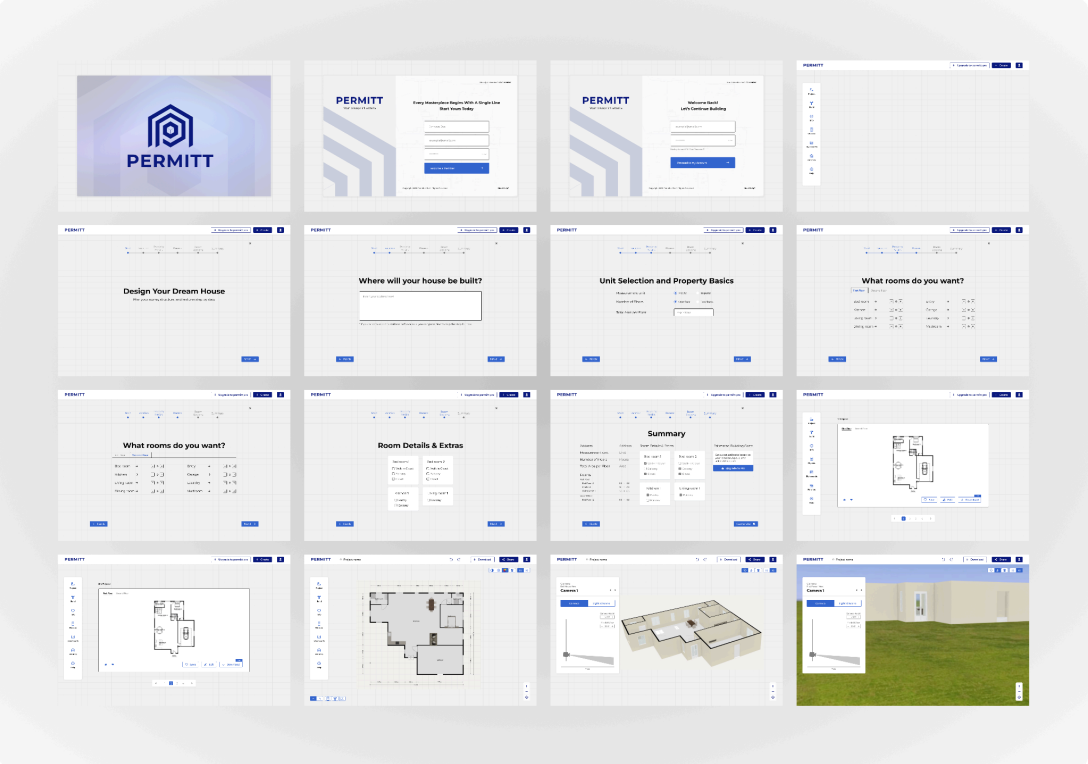

Figure A10 Permitt.ai UI/UX for the initial MVP (Hani Alsayah, 2025)

A.3.3 MVP Development

Approximately three months after initiating the Permitt.ai venture, the team commenced the development of its Minimum Viable Product (MVP). By this stage, the founders had successfully onboarded the necessary technical talent—specifically a full-stack developer and an AI/ML

engineer—and finalized the UI/UX design based on earlier customer research and competitive benchmarking.

The first version of the MVP was developed to address core aspects of the building permit application process, providing an initial solution that partially resolved the identified user pain points. The development approach followed an iterative methodology, with continuous improvements being made based on internal testing and technical feedback.

As of the time of writing, the MVP remains under internal testing and refinement. A public beta release is planned for July 2025, marking a significant milestone toward broader market validation and user onboarding. This phase reflects the transition from research and planning to hands-on execution, in alignment with the iterative and user-driven principles outlined in the refined startup blueprint.

A.4 Fundraising Strategy

Permitt.ai's fundraising journey began with a bootstrapping approach, enabling the team to conduct early-stage research, develop initial branding, and validate their market assumptions. The first significant external contribution came through a strategic sweat-equity investment from Lynkrr AB, a venture studio that committed services valued at 500,000 SEK. This partnership provided critical support in product design, branding, web development, Legal and financial setup and early team formation.

As of the time of writing, the team is nearing completion of the MVP and has established a foundational digital presence. In preparation for the next phase, Permitt.ai, together with Lynkrr AB, is actively working on its pre-seed fundraising strategy. This includes formulating an investment case, developing a data-driven pitch deck, and outlining a clear roadmap for platform launch and early growth.

Although no investor outreach has been initiated by the submission date of this thesis, the founders aim to raise their pre-seed round by December 2025. If successful, this milestone would mark the achievement of a fully developed, tested, and market-ready product within a 12-month timeframe, validating the practicality and acceleration potential of the refined ConTech startup blueprint.

A.5 Reflections on the Blueprint in Practice

Applying the dual-track startup blueprint in the case of Permitt.ai demonstrated the practicality and efficiency of the framework in guiding a first-time founding team through the startup journey. From day one, the founders aligned their process with the steps outlined in the blueprint, enabling them to move systematically from ideation and validation to legal setup, team formation, and product development. The structure allowed them to make rapid progress while maintaining a strong strategic foundation, avoiding unnecessary detours or delays often experienced in early-stage ventures.

While the framework proved effective in accelerating development, its full viability remains subject to further validation, particularly as the team prepares for MVP launch and pre-seed fundraising

scheduled for the second half of 2025. These future milestones will help assess how well the framework supports long-term scalability and investor readiness in real market conditions.

According to Hani, the founder of Permitt.ai, the blueprint was especially valuable in offering clear direction despite his limited prior experience in launching tech startups. In his words, "*The framework supported us all the way, from refining the idea to building the company and the team. It helped me understand startup culture, think critically about what we're offering, and move forward with confidence.*"

This early experience suggests that the blueprint not only provides structural clarity but also empowers non-technical founders in navigating the multifaceted challenges of starting a ConTech venture.