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ADDRESSING DIGITAL STARTUP FAILURE THROUGH THE AGILE METHODOLOGY APPROACH: A SYSTEMATIC LITERATURE REVIEW

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Abstract—*Startups are recognized as emerging enterprises that contribute to job creation, economic stabilization, and national development. Digital startups are formed to address challenges within their environments. This study aims to provide solutions and preventive measures for digital startup failures, given the persistently high global failure rate of 90%. A systematic literature review (SLR) was conducted to identify Agile-based Critical Success Factors (CSFs), which were then mapped as solutions to mitigate digital startup failures. Based on the findings, the most significant contributing factor to the failure of digital startups is insufficient funding (i.e., running out of capital or financial resources). To address this issue, the agile method offers relevant solutions that can be mapped to the problem, namely the adoption of "Iterative Budget Management," "Accurate Effort Estimation," and "Risk Management Strategies." This study provides practitioners with valuable insights, knowledge, and reference points regarding the critical success factors (CSFs) derived from agile practices, which can serve as strategic mechanisms for mitigating failure in early-stage startups. Moreover, the research is expected to contribute new theoretical understanding that informs potential solutions to prevent digital startup failure.*

Keywords: *agile-based CSFs, digital startups, SLR methodology, startup failure.*

Abstrak—*Startup dikenal sebagai perusahaan rintisan yang berkontribusi dalam penciptaan lapangan kerja, stabilisasi ekonomi, dan pembangunan nasional. Startup digital terbentuk untuk menjawab tantangan dan permasalahan di lingkungannya. Penelitian ini bertujuan memberikan solusi dan menawarkan langkah pencegahan terhadap kegagalan startup digital, mengingat tingkat kegagalan global yang masih tinggi, yaitu 90%. Metode systematic literature review (SLR) digunakan untuk mengidentifikasi Critical Success Factors (CSF) berbasis agile, yang kemudian dipetakan sebagai solusi dalam mengatasi kegagalan startup digital. Berdasarkan temuan, faktor utama penyebab kegagalan startup digital adalah kekurangan pendanaan (kehabisan modal atau sumber daya keuangan). Untuk mengatasi permasalahan tersebut, metode agile menawarkan solusi yang relevan, yaitu melalui penerapan Iterative Budget Management, Accurate Effort Estimation, dan Risk Management Strategies. Penelitian ini memberikan wawasan, pengetahuan, dan referensi berharga bagi para praktisi mengenai CSF berbasis agile yang dapat berfungsi sebagai mekanisme strategis untuk mengurangi risiko kegagalan pada tahap awal startup. Selain itu, penelitian ini diharapkan dapat memberikan kontribusi teoritis baru yang menjadi dasar pengembangan solusi untuk mencegah kegagalan startup digital.*

Kata Kunci: *CSF berbasis agile, startup digital, metodologi SLR, kegagalan startup.*

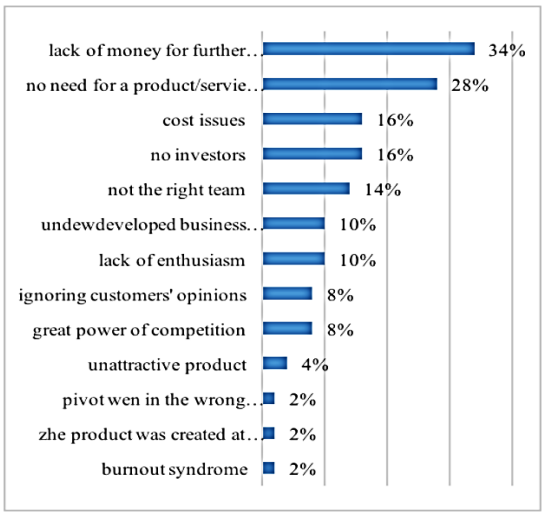
INTRODUCTION

It should be noted that the startup sector is constantly growing with the latest developments, driven by out-of-the-box creativity capable of capturing the attention of clients and encouraging them to use the products or services offered. (Media, 2020). According to Binowo & Hidayanto (2023) a digital startup is an organization that uses information technology to solve problems. Digital startups can alternatively be defined as new companies with high scaling potential that face higher risks than typical enterprises that do not use IT (Binowo & Hidayanto, 2023). Startups are referred to as national development and economic stabilization, their contribution can generate new jobs (Zaidi et al., 2021). Startups can be the primary

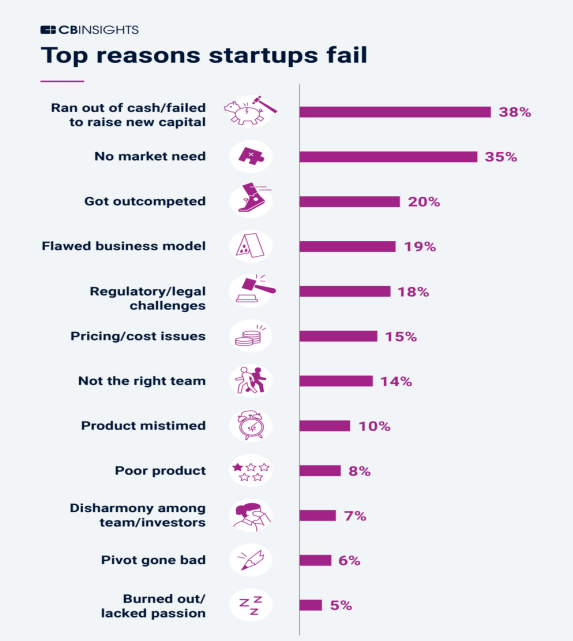
foundation of economic development in a region or country (Binowo & Hidayanto, 2023).

According to Wu et al. (2022), internal activities can be a difficult task for prospective startup founders, particularly those who are still in the early stages of product innovation and business model development. Many startups fail due to the difficulty of the task. The failure rate of startups globally is still at 90% (Binowo & Hidayanto, 2023; Chernev, 2022; Kotashev, 2022). According to research from Bednár & Tarišková (2018), startups fail for a variety of reasons and problems. There are 13 factors that contribute to startup failure, and these factors are closely associated with the artefacts of the agile method methodology, as they intersect with cost estimation, product development, funding, and related dimensions (see Figure 1). Meanwhile, according to data from technology research institutes (CB Insights, 2021), 12 factors contributing to startup failures have been identified (see Figure 2). These failures are predominantly observed in industrial sectors that have already adopted Information Technology (IT). As illustrated in Figure 3, these sectors have experienced significant rates of failure.

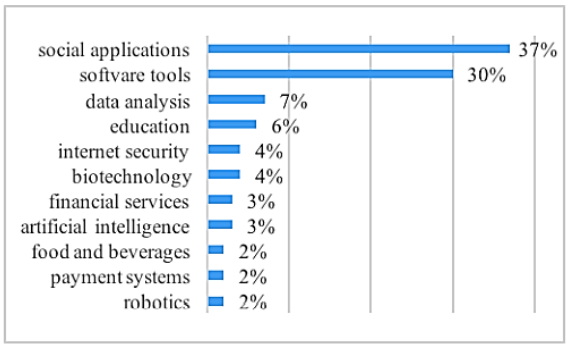
The persistent recurrence of digital startup failures on a global scale underscores the urgent need for effective solutions. One promising approach involves mapping remedial strategies derived from agile methodologies to address and mitigate such failures. The adoption of agile methodologies is anticipated to provide pivotal solutions for addressing startup failures and even preventing impending collapses. While it is hoped that modern-era startups would overcome such setbacks, empirical evidence reveals that failure rates remain alarmingly high.



Source: (Bednár & Tarišková, 2018)
Figure 1. Causes of Startup Failure



Source: (CB Insights, 2021)
Figure 2. 12 Reasons Startups Fail



Source: (Bednár & Tarišková, 2018)
Figure 3. Startup Sector

Research by Binowo & Hidayanto (2023), Bednár & Tarišková (2018) and Chernev (2022) highlights that many startups falter within their first year of operation, raising critical questions about the underlying factors that impede the sustainability of digital startups beyond this initial phase. To the best of the author's knowledge, no previous studies have investigated solutions to startup failure by applying best practices from the agile methodology through a Systematic Literature Review (SLR) approach.

As previously stated, startups typically fail during their initial phase (the first year), a critical period in which stakeholders require collaborative cohesion, appropriate technologies, precise tools, and rigorously validated methodologies to guide development. These components are critical to reducing recurring failures. The purpose of this study is to propose solutions or mitigation strategies for startup failure, which are the result of

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a structured identification process based on the agile methodology approach. Specifically, all critical factors contributing to startup success are examined through the lens of agile principles, and then mapped as targeted responses to the primary causes of startup business failure. In this study, artefacts from the agile methodology are identified as a useful lens for mapping the factors that contribute to startup failure. These Agile artefacts are then proposed as potential critical success factors (CSFs) that can serve as strategic solutions to prevent failure in digital startup enterprises (Gabriel et al., 2021).Therefore, this study is crucial in addressing an existing research gap, namely the absence of prior investigations that explore solutions to startup failure through best practices derived from the Agile methodology using a Systematic Literature Review (SLR) approach. Mapping the intersection between agile best practices and the factors contributing to digital startup failure is essential in formulating evidence-based solutions through the rigour of the SLR method.

LITERATURE REVIEW

Digital Startup

In recent times, there has been considerable confusion regarding the distinction between conventional startups and digital startups. To address this ambiguity, the following explanation clarifies the concept of a digital startup. Fundamentally, a digital startup refers to an innovative, rapidly developing technology-driven enterprise (Startup Commons, 2022). According to Binowo & Hidayanto (2023) a digital startup is a digitally oriented organization that leverages information technology as its primary problem-solving tool. In contrast, Binowo & Hidayanto (2023) posits that a digital startup constitutes a small-scale technology venture or newly operational business lacking a clearly defined business plan. Meanwhile Mingione & Abratt (2020) argues that a digital startup is rooted in digital contexts, aiming to generate shared value with customers and stakeholders through online communities. Such entities typically experience rapid expansion and swiftly evolve into successful enterprises.

Therefore, a digital startup constitutes a small-scale enterprise within the digital economy, characterised by robust innovative components and the potential to attain substantial profitability (Binowo & Hidayanto, 2023). However Ghezzi (2019) concludes that a digital startup is a technology-driven business that launches products and services through a series of newly developed practices designed to test and validate its business model. This implies that digital startups serve as a driving force for the knowledge-based economy, underpinned by their digitally verified performance reputation – a status frequently affirmed through social media engagement (Binowo & Hidayanto, 2023; Gong & Ribiere, 2021; Tajpour & Hosseini, 2021).

Agile Method

The Agile Method is a contemporary approach currently implemented across industries to facilitate rapid software development (Rehman et al., 2020). The methodology was formally established through the introduction of the Agile Manifesto in 2001 (Saeed et al., 2021). Agile strategies were initially adopted by companies in Japan during the 1980s to enhance product innovation (Tajpour & Hosseini, 2021). The agile approach is grounded in a framework of concepts encompassing agile practices, measurable metrics, and selective processes (Thesing et al., 2021). At its core, Agile emphasizes self-organizing teams, swift execution, value-driven priorities, and business-oriented objectives. Agile practices inherently advocate for self-managing (or self-led) teams, empowering them to autonomously coordinate their workflows. This methodology led to the formulation of the Agile Manifesto. Consequently, it has reshaped conventional waterfall methodologies (Ching & Mutuc, 2019). In the modern context, Agile is defined as a change-responsive mindset. Thus, the following research questions (RQ) are proposed:

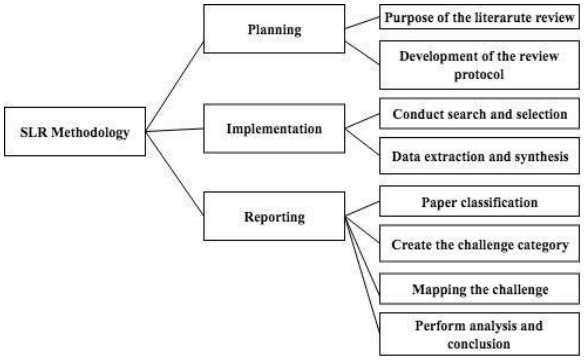
RQ1: *What factors within agile methodologies contribute to the success of digital startups?*

RQ2: *What mapping of Critical Success Factors (CSFs) from agile methodologies is applicable to digital startup development?*

MATERIALS AND METHODS

As recommended by Kitchenham & Charters (2007) the author designed, conducted, and reported the review in alignment with the Systematic Literature Review (SLR) process. SLR serves as a methodological tool to explore research objectives and subsequently identify related research questions. The primary aim of this approach is to derive evidence-based answers to these inquiries (Kitchenham & Charters, 2007). SLR is critical for examining current research gaps, thereby proposing novel findings and frameworks for future investigative work. The author conducted and implemented the verification protocol of the SLR method, particularly within the planning phase, as the initial stage of the systematic literature review. As illustrated in Figure 4, the SLR was

executed in three sequential stages: literature review planning, implementation, and reporting.



Source: (Marlina & Purwandari, 2019)
Figure 4. SLR Methodology

SLR Planning Stages

In this research, the author determined the SLR requirements, developed the review protocol, and evaluated its validity. During the planning phase, the author established filtering criteria to identify relevant studies and formulated inclusion/exclusion protocols. The search strategy comprised three components: search terms, literature sources, and a search process involving selected databases (IEEE Explore, Science Direct, and ACM Digital Library).

To conduct the search and identification process, the author first employed the keywords critical success factors and digital startups. These were defined as: ("critical" OR "success" OR "factors" OR "digital" OR "startups").

The second keyword group pertained to agile methodologies, articulated as "agile methodologies". Subsequent keywords included: ("project management" OR "enterprises" OR "information systems" OR "information technology"). The final search query combined these three keyword groups as follows: ("critical" OR "success" OR "factors" OR "digital" OR "startups") AND "agile methodologies" AND ("project management" OR "enterprises" OR "information systems" OR "information technology"). The search specifically targeted keywords related to agile methodologies and digital startups. During the search, the author applied the inclusion and exclusion criteria outlined in Table 1.

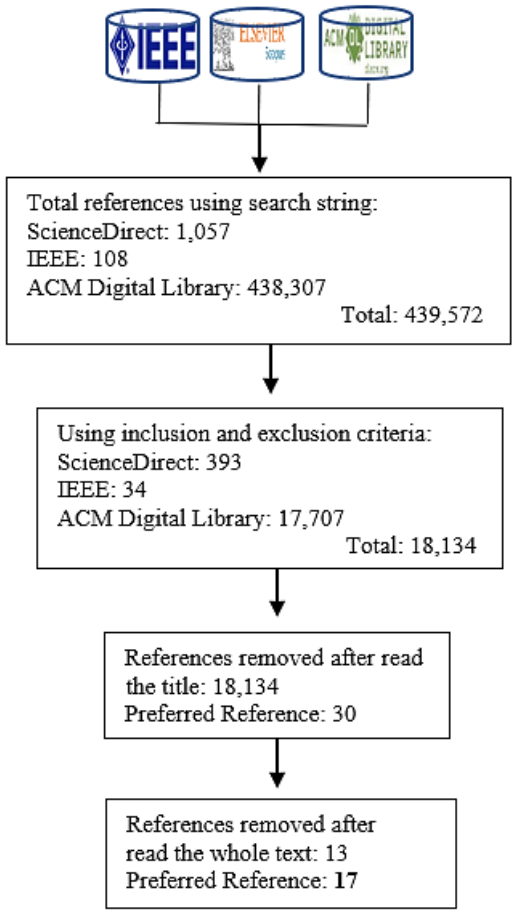
Table 1. Inclusion and Exclusion Criteria

Inclusion criteria	
Language	English
Timeframe	2019 - 2025
Type	Journal articles and conference proceedings
Focus of Study	Agile methodologies, Agile success factors, startup CSFs, startup failures, startup development, digital startups.
Exclusion criteria	
Type	Books, newspapers, magazines, website news articles.
Focus of Study	Studies discussing *only* Agile methodologies, digital startups, or Agile methodologies for success/benefits.

Source: (Research Results, 2025)

SLR Implementation Stage

The implementation process of the SLR commenced with the identification of keywords within the predetermined journal databases. At this stage, the search was conducted in alignment with the research focus. The initial search yielded 439,572 articles (see Figure 5). The second step involved applying the timeframe and inclusion criteria for report types to manually eliminate articles, alongside the exclusion standards to refine valid search results. In the second round, 18,134 articles met the established criteria. The final step entailed topic-based screening, resulting in 30 papers relevant to the research scope. Subsequently, abstract screening led to the selection of 17 articles.



Source: (Research Results, 2025)
Figure 5. Extraction Process

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SLR Reporting Stage

During the reporting stage, the 17 selected papers were evaluated and classified. A classification system for agile methodology Critical Success Factors (CSFs) was then developed to map associated factors, descriptions, and references. Furthermore, a mapping between identified challenges (failure factors) and actionable solutions was created to support the reporting process.

RESULTS AND DISCUSSION

This section addresses the research questions posed earlier. Building on the reporting stage of the SLR, the findings are presented in terms of the classification of agile methodology Critical Success Factors (CSFs) and the mapping of identified challenges (failure factors) to validated solutions.

In addition, the screening results provide an overview of the distribution of relevant Q1 journals considered in this study. Table 2 presents the dispersal of these journals and their respective publishers, which demonstrates the quality and scope of sources forming the foundation of this research.

Table 2. Dispersal of Relevant Research in Q1

Journal Publisher	Sum
International Journal of Project Management	4
Journal of Systems and Software	1
International Journal of Information Management	1
Procedia Computer Science	2
Reliability Engineering and System Safety	2

Source: (Research Results, 2025)

Identification of CSFs Based on Prior Research

Table 3 presents the analytical results of agile methodology Critical Success Factors (CSFs) for solution-based project management. The SLR findings indicate 15 CSFs within agile techniques applicable to digital startup project development. Among these 15 factors, several serve as actionable solutions that can be systematically mapped to address digital startup failures. References (Bednár & Tarišková, 2018) and (CB Insights, 2021) highlight that the primary cause of startup failure is insufficient funding or capital. In this context, agile methodologies offer a framework to mitigate such failures by controlling budgetary management efforts, specifically through effort estimation and cost estimation.

Among the fifteen identified factors, team capability emerged as a critical contributor to the success of IT projects. Within agile methodologies, team capability is recognized as a pivotal success factor. To enhance IT project development (e.g., digital startups), Hammad et al. (2019) advocates for fostering and maintaining harmonious communication within teams, ensuring cohesive project execution. Furthermore, the author emphasizes the necessity of implementing risk management strategies during IT project development. Such strategies enable rapid and precise handling of challenges, thereby safeguarding project viability (Hammad et al., 2019).

Existing literature includes studies that define critical success factors (CSFs) for agile methodologies. The author propose these CSFs as actionable guidelines for individuals or teams engaged in digital startup development. The identified factors, derived from a rigorous analysis of selected literature, are systematically summarized in Table 3.

Table 3. CSF Classification of Agile Methods

Factor	Description	Source
Focus on the application of agile software development	Revise your organization's current software strategy to ensure that Agile software updates are more effectively synchronized with the constraints inherent in safety-critical systems.	(Islam & Storer, 2020)
Team Capabilities	The team should possess a combination of expertise, practical experience, distinct personality traits, autonomy in project execution, and a diverse composition.	(Thesing et al., 2021), (Tam et al., 2020), (Radhakrishnan et al., 2022), (Kasauli et al., 2021), (Fireteanu, 2020)
Customer (client) Engagement	Client engagement involves active and meaningful interactions with representatives from the client side.	(Tam et al., 2020)
Managing the Budget	Budgeting must incorporate accurate and dependable cost elements, enabling straightforward estimation of effort or expenses. Efficiency management should be optimized to avoid incurring unnecessary or excessive costs.	(Thesing et al., 2021)
Managing Time	Bringing a viable product to market within a reasonable timeframe is essential. The established timeline must strictly align with the projected completion date, necessitating a precise and well-defined estimation of the project duration.	(Thesing et al., 2021), (Ciriello et al., 2022)
Realization of the information system framework	Benefits Realization Management (BRM) ensures that the anticipated advantages linked to your IT project	(Mkoba & Marnewick, 2020)

Factor	Description	Source
	are not only achieved but also sustained over time.	
People	Human-related factors such as Agile proficiency, project management skills, collaborative teamwork, team empowerment, Agile-specific attributes, customer rapport, and overall team capabilities play a pivotal role in project success.	(Sithambaram et al., 2021), (Burga et al., 2022), (Altuwaijri & Ferrario, 2022)
Process	Process-related factors encompass process adaptability, project scope, requirements definition, planning, and the monitoring and reporting of progress.	(Sithambaram et al., 2021)
Accountability experience	Accountability experience refers to the alignment between a team's perception of its standing as an Agile unit within an organization, its practical experience in implementing Agile technical practices, and its proficiency in fostering interaction and knowledge-sharing among team members.	(Burga et al., 2022)
Agile knowledge management	Knowledge management serves as a significant catalyst for both product and organizational growth. It facilitates the effective generation, dissemination, and utilization of information.	(Jiménez-Espada & González-Escobar, 2021)
Stakeholder Commitment	The foundation of this model lies in the commitment demonstrated by top-level management. It is widely acknowledged that the degree of stakeholder dedication to a project significantly influences its success.	(Russo, 2021)
Pair Programming	Paired programming encourages developers to approach code refactoring with greater caution, thereby minimizing the effort required for extensive revisions. Many advantages of paired programming overlap with other practices, such as refactoring.	(Cao et al., 2010)
Estimated effort	Effort estimation can be categorized into various approaches, including algorithm-based, expert-based, and machine learning-based methods. Precise effort estimation plays a crucial role in ensuring the success of software development projects.	(Saeed et al., 2021)
Risk Management Strategy	While the risk management process is indispensable in such systems, it often conflicts with the inherent principles of Agile methodologies.	(Hammad et al., 2019)
Open communication between teams	Effective communication positively impacts both development teams and stakeholders, fostering collaboration and alignment.	(Ching & Mutuc, 2019)

Source: (Research Results, 2025)

Mapping Digital Startup Failures to Agile Methodology Solutions

Following the identification of Critical Success Factors (CSFs) for Agile methodologies, a systematic mapping between prevalent issues/failures and their corresponding solutions for digital startups employing Agile approaches has been developed (Table 4). Common challenges encountered by startups during their first operational year, along with Agile-driven solutions to address them, are comprehensively outlined in Table 4.

Table 4. Problem-To-Solutions Mapping

Problem	Mapped Solutions
Insufficient Funding (Lack of money)	1. Managing the Budget (In the context of Agile methodology, budget management should avoid wasteful expenditure on features that have not yet been validated by the market. Financial allocations must be based on the principles of Minimum Viable Product (MVP) and validated learning, and investments should be aligned with actual progress rather than assumptions. Accordingly, the proposed solution involves implementing Agile budgeting per sprint, utilizing a burn rate dashboard that is monitored in each iteration, and engaging the Product Owner in overseeing financial control within the backlog.) 2. Estimated effort (To mitigate the risks of underestimation that frequently lead to budget overruns, it is imperative to predict human resource and tooling requirements realistically and avoid costly rescheduling. This may be achieved by leveraging historical sprint data to inform future estimations, accounting for technical debt in planning, and integrating effort estimations with direct cost projections.) 3. Risk management strategies (A proactive risk management strategy involves identifying potential sources of financial waste before funds are depleted, establishing contingency plans for cost deviations, and reducing reliance on large upfront investments. This approach includes maintaining a financial risk register as an integral agile artefact,

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Problem	Mapped Solutions
	employing risk indicators (e.g., declining team velocity, inaccurate estimations), conducting sprint-based risk reviews, and linking these evaluations with clearly defined financial tolerances.)
Unnecessary / inappropriate products	1. Customer/Client Involvement (Active involvement of customers or clients is essential to ensure that the product being developed aligns closely with real user needs. Engaging end-users throughout the development lifecycle enhances relevance, usability, and adoption potential, thereby reducing the likelihood of building solutions that lack market demand.) 2. Agile Knowledge Management (Implementing agile knowledge management enables more effective absorption of market and customer insights into the product development process. Through continuous learning loops and the rapid dissemination of contextual knowledge across teams, organizations can improve responsiveness to shifting customer preferences and market conditions.) 3. Team Competence (Building a team with complementary expertise including data science, UX design, and business acumen is fundamental to delivering user-centric products. Ongoing training is essential to strengthen product intuition and customer empathy. Practices such as pair programming and collaborative refinement sessions help ensure that the team iteratively improves both the technical and functional aspects of the product in alignment with user expectations.) 4. Validation Processes by the Right Team (Continuous validation through iterative testing conducted by an appropriately skilled team helps detect and resolve product misalignments at an early stage. This approach supports a fail-fast, learn-fast strategy, reducing the risk of developing features that do not resonate with the market.)
Not the right team	1. Team Capability (Selecting a team with multidisciplinary expertise such as data science, UX design, and business strategy is vital for developing effective and market-relevant digital products. Regular training programs should be conducted to enhance product sense and customer empathy. Additionally, practices like pair programming and collaborative refinement sessions promote continuous learning, knowledge sharing, and quality improvement.) 2. Fostering Team Accountability Cultivating a culture of accountability within the team ensures that each member takes ownership of outcomes and contributes to a shared commitment to product success. Clear role definition, transparent progress tracking, and retrospectives are mechanisms that support this accountability. 3. Client/User Engagement (Actively involving clients or end-users throughout the development process ensures that the product remains aligned with their evolving needs. Feedback loops with real users help validate assumptions and inform feature prioritization based on actual value.) 4. Open Communication across Teams (Open and transparent communication among cross-functional teams is essential for effective collaboration. This practice reduces misunderstandings, accelerates problem resolution, and ensures that everyone shares a common understanding of goals, priorities, and challenges.) 5. Pair Programming and Collaborative Refinement (Employing pair programming and holding regular collaborative refinement sessions enhances code quality, facilitates knowledge transfer, and fosters team cohesion. These practices also support faster detection of issues and more responsive product development cycles.)
Got outcompeted	1. Focus on the implementation of agile software development 2. Communication must be open across teams 3. There must be a commitment to stakeholders 4. Realize (or Implement) the information systems framework
Flawed business model	1. Seek accountable experiences 2. Conduct iterative processes to ensure the business model is accurate and truly aligned with market fit 3. People/Clients (engage clients to ensure the product aligns more closely with their real needs) 4. Team Capability (select a team with complementary expertise, including data science, UX design, and business acumen. Implement regular training to strengthen product sense and customer empathy, along with practices such as pair programming and collaborative refinement sessions)

Source: (Research Results, 2025)

CONCLUSION

Based on a systematic mapping of failure factors and their corresponding agile-based solutions, this study demonstrates that financial constraints in digital startups can be addressed through iterative budget management, accurate effort estimation, and comprehensive risk management strategies. These approaches emphasize aligning financial planning with actual progress rather than assumptions, incorporating empirical sprint data into cost projections, and proactively identifying financial risks. Such agile practices ensure efficient resource allocation, reduce unnecessary expenditures, and mitigate budgetary uncertainties, all of which contribute to startup failures.

Furthermore, one of the most commonly cited causes of startup failure is a mismatch between product offerings and market needs, which can be addressed by increasing client involvement, leveraging agile knowledge management, improving cross-functional team capabilities, and implementing continuous validation processes. Inadequate team composition, poor business models, and competitive disadvantage can all be mitigated by combining stakeholder commitment, open communication, accountable team dynamics, and agile development implementation. Overall, these findings highlight the importance of agile artefacts not only as process enablers, but also as strategic tools for startup survival and sustainability.

Research Implications

Through the Critical Success Factors (CSFs) identified from the Agile methodology, this study provides essential information and insights into the key factors involved in launching startups for entrepreneurs, aspiring startup founders, and other stakeholders (such as mentors). This research offers the potential to deliver impactful solutions for business practitioners, particularly digital startup enthusiasts, addressing common challenges frequently encountered by startups. It is hoped that this study will contribute to reducing the failure rate of digital startups.

Limitations

From the perspective of practical agile methodologies, there are several solutions in practice that align with agile principles. However, different search strings were used in the process. Some prior researchers have argued that statistical extraction in Systematic Literature Reviews (SLRs) may be biased or overlooked due to irrelevant selection processes. The search strings used in this study were highly restricted to minimize the margin of error in targeting reference sources. This research is constrained by the rule that the publication period is limited to the last six years, specifically from January 2019 to June 2025. There is a concern that this may not fully represent all potential Critical Success Factor (CSF) solutions using agile methods, necessitating further adjustments.

Future Research Directions

Future research directions may be more specifically oriented towards the early-stage phase of digital startups, where resource constraints, strategic uncertainty, and the pursuit of product-market fit constitute the principal challenges. Subsequent studies could examine how Agile based project management practices may be adapted to the distinctive needs of newly established startups (for instance, in sectors such as fintech or edtech), or be empirically tested within incubator and accelerator programs. Accordingly, future investigations may provide a more applicable and practice-oriented framework for startups navigating the initial stages of growth.

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