MANAGEMENT METHODOLOGIES IN ROMANIAN SOFTWARE STARTUPS

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The current paper explores management methodologies used in Romanian startups, focusing on how different factors such as leadership styles, team sizes, and investment practices affect them. A questionnaire presented to 26 different startups revealed Agile as the most commonly used methodology, especially among small teams, due to its simplicity. As team sizes increased, startups shifted toward more structured methods like Waterfall. Leadership styles were also closely linked to methodology, with Democratic pairing well with Agile. 60% of respondents mentioned receiving investments, which prompted shifts towards more formal practices. The findings highlight how internal team dynamics and external pressures shape management strategies across a startup's lifecycle.

Keywords: Software startups, Management methodologies, Agile practices

1. Introduction

Running a software startup means constantly dealing with fast-changing conditions, limited resources, and pressure to grow while still keeping innovation alive. In this kind of environment, the way a team is managed makes a huge difference. Management approaches help guide how teams make decisions, divide up work, and stay aligned, which makes them vital, especially in the early and often chaotic stages of a startup. Foundational frameworks such as those described by Blank and Dorf [1] emphasize the need for disciplined execution alongside innovation, especially when startups are still shaping their product and market fit.

There are many management styles available, but in practice, most teams stick to a few familiar ones. This research focuses on the most used approaches that are employed by Romanian startups, including Agile, Scrum, Kanban [2], and Waterfall [3]. In addition, we also review other methodologies frequently referenced in startup literature, such as Lean Startup [4], DevOps [5], and Design Thinking [6]. These modern frameworks are not reflected in our study's responses

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but are included to provide a broader context for analysis and to highlight potential gaps in adoption. Agile is often praised for being flexible and fast-moving [7], while Waterfall can be a better fit when strict planning and structure are needed [8]. Scrum and Kanban offer practical frameworks that support team coordination, continuous improvement, and role clarity. Literature also suggests that newer approaches like Lean Startup encourage rapid experimentation and data-driven decisions, while DevOps and Design Thinking offer technical automation and user-centered innovation, respectively. Some startups adopt hybrid models that combine elements of multiple methodologies to suit their specific operational needs [9].

In this study, we also looked at how outside factors like leadership style, team size, and investor involvement influence management choices. Although we did not directly measure success, we examined reported patterns and preferences that offer insights into how Romanian software startups align internal processes with evolving business needs. A major reason for conducting this research comes from the high number of startups that fail early on. Some sources estimate failure rates near 90 percent, often linked to resource mismanagement, poor planning, or lack of product-market fit [10]. In Romania, around 51% of startups survive beyond their first five years, placing the country in a relatively strong position compared to others in Europe [11]. Entrepreneurship levels remain steady, but fear of failure still prevents many individuals from pursuing startup opportunities [12]. Our findings are based on a questionnaire offered to 26 Romanian software startups. We collected a mix of short and long responses across 11 questions, covering management practices, team structures, leadership approaches, investment, and adaptability.

The remainder of this paper is structured as follows. Section 2 presents the materials and methods, including a brief literature review and an explanation of how the questionnaire was designed and conducted. Section 3 outlines the key results from the collected data, highlighting trends in management methodologies, leadership styles, and investment influences. Section 4 provides a discussion of these findings in relation to existing research, and Section 5 concludes the study by summarizing the main insights and proposing directions for future work.

2. Materials and Methods

This section showcases prominent existing methodologies, some of their benefits, the impact investors can have on startups, as well as how we designed our study to investigate correlations between methodologies being employed by different startups and their success.

2.1. Overview of Management Methodologies

This section presents an overview of project management methodologies relevant to software startups. It is divided into three parts. First, we describe the

core methodologies that are actually employed by the startups in our sample, including Agile, Scrum, Kanban, and Waterfall. Second, we provide a brief literature-based summary of modern approaches such as Lean Startup, DevOps, and Design Thinking, which, while often discussed in startup research, were not reported by our respondents. Finally, we examine hybrid approaches and the suitability of different methodologies depending on the stage of a startup's lifecycle.

2.1.1. Methodologies Used by Respondents

Agile [2] is a flexible and collaborative project management approach that emphasizes iterative development and regular feedback. It is structured around short cycles known as sprints, typically lasting two weeks, during which a product undergoes incremental changes. The Agile Manifesto, published in 2001, emphasizes delivering value early and often, prioritizing customer collaboration and adaptability over rigid planning [7]. Agile is widely adopted in software startups due to its responsiveness to change and alignment with fast-moving environments.

Scrum [2] is a widely used framework based on Agile principles. It is particularly well suited for smaller teams and emphasizes well-defined roles such as Scrum Master, Product Owner, and Developer. Scrum introduces structured events, including Sprint Planning, Daily Scrums, Sprint Reviews, and Sprint Retrospectives. These rituals help manage workload, promote accountability, and support scalability as startups grow and mature.

Kanban [2] is a visual workflow management approach that tracks the status of tasks using boards, usually divided into columns such as "To Do," "In Progress," and "Done." Kanban limits work in progress, helping teams maintain focus and reduce bottlenecks. Its flexibility and emphasis on continuous flow make it ideal for environments with shifting priorities and the need for frequent adjustments without strict sprint cycles.

Waterfall is a traditional software development model characterized by a linear and sequential process. Each phase, namely requirements gathering, design, implementation, testing, and maintenance, must be completed before the next one begins. Waterfall is most suitable for projects with well-defined requirements and a limited need for flexibility. While less commonly used in early-stage startups, it may be adopted by more established startups managing larger teams or client-driven projects [3].

2.1.2. Modern Methodologies

Although not reported by respondents in our study, several modern methodologies are frequently referenced in the literature as valuable frameworks

for startups. These include Lean Startup, DevOps, and Design Thinking, which are often promoted for their focus on experimentation, user feedback, and automation.

Lean Startup, popularized by Ries [4], emphasizes rapid experimentation, validated learning, and efficient resource use. At its core is the concept of a Minimum Viable Product (MVP), which enables teams to test assumptions quickly and with minimal investment. Lean Startup supports continuous iteration and data-driven decision-making, making it particularly suitable for early-stage ventures dealing with high uncertainty.

DevOps bridges development and operations to improve collaboration, accelerate release cycles, and ensure product stability. It incorporates principles such as continuous integration, continuous delivery, and automation. Though more commonly associated with infrastructure and deployment teams, DevOps can support startups as they scale by reducing errors and improving delivery speed [5].

Design Thinking is a user-centered approach to problem-solving that includes five stages: empathize, define, ideate, prototype, and test. It emphasizes deeply understanding user needs and iteratively developing solutions to meet them. While more often applied in product design and UX contexts, Design Thinking can be useful for startups looking to build market-relevant solutions through structured creativity and feedback loops [6].

2.1.3. Hybrid Methodologies

Hybrid methodologies combine elements from multiple frameworks to adapt to complex project needs. Although not explicitly identified by respondents in our study, these approaches are increasingly discussed in the literature as practical strategies for balancing structure with adaptability.

One such example is the Agile-Waterfall Hybrid, which allows development teams to work iteratively while maintaining high-level planning and predictability. This combination is particularly helpful for projects that require compliance or long-term milestones while still benefiting from Agile's flexibility [13]. Another model, proposed by Cocchi et al. [14], integrates elements of Design Thinking, Lean Startup, and Agile. It begins with identifying user needs, validating concepts through MVPs, and iterating using Agile principles. This layered approach offers a roadmap for navigating early-stage uncertainty while staying aligned with user needs. Agile can also be effectively combined with DevOps to improve release frequency and reduce production errors. This synergy allows startups to bring products to market faster while maintaining quality through automation and continuous feedback [15].

2.1.4. Suitability of Methodologies in Different Startup Stages

Although our study primarily focuses on methodologies reported by respondents, we also explored how these and other approaches align with different

phases of a startup's development, drawing from both literature and questionnaire responses.

In the earliest stages of a startup, teams often face high uncertainty, limited resources, and rapidly shifting priorities. Agile and Lean methodologies are frequently cited as effective tools in this context, offering flexibility, rapid prototyping, and iterative delivery [16]. The concept of the Minimum Viable Product (MVP) plays a central role, allowing startups to test assumptions with minimal investment while gathering early user feedback. These methods prioritize speed and responsiveness, which are essential for validating ideas and making quick adjustments.

However, applying these approaches is not always straightforward. Bosch et al. [17] note that the unstructured nature of early-stage startups can make implementing Lean principles particularly challenging. To address this, they propose the Early-Stage Software Startup Development Model, which provides guidance on managing multiple product ideas, determining when to pivot or continue, and navigating early development uncertainty in a more systematic way.

As startups move into the growth stage, their focus shifts from experimentation to managing complexity and scaling operations. Scrum becomes more popular in this phase due to its structured sprint cycles, role definitions, and ability to maintain alignment within larger teams [18]. Kanban also plays an important role by helping teams visualize tasks, prioritize work, and manage ongoing change in a flexible way [19].

Lean principles continue to be valuable during the growth phase, but their application evolves. Startups begin to incorporate more formal practices such as continuous integration, incremental testing, and systematic process improvements [20]. These adaptations help maintain productivity, reduce waste, and ensure coordination as responsibilities become more specialized. The initial Lean focus on speed and experimentation gives way to a more balanced approach that emphasizes long-term sustainability and internal efficiency.

Once startups reach a more stable stage in their development, traditional methodologies often become more relevant. Waterfall or the Rational Unified Process are particularly well-suited for projects that require extensive planning, documentation, and regulatory compliance [21]. These models offer predictability and clearly defined workflows, which are important for managing risk in complex, high-stakes environments. Even so, many companies continue to integrate elements of Agile into these frameworks, maintaining a degree of adaptability while benefiting from the structure and control of traditional planning [19].

2.2. Case Study

The main findings of our paper involve a study performed on a variety of different startups in the country of Romania. A total of 26 different startups were presented with a questionnaire, with a chosen representative from each answering 11 different questions and administered via a Google Docs Form. Though as this information was not collected at the time. These questions ranged in variety from what methodology is currently in use, to what, if anything, they used in the past, as well as what leadership methodologies are being employed, and what are some of the main issues that the teams are facing (see Appendix A1). Similarly, the people answering these questions occupied various roles inside their respective startups, from simple developers to team managers and project managers.

These startups also range in variation from the number of teams they have at their disposal, as well as the size of each of these teams. The distribution of team size to the number of startups can be observed in Fig. 1. It is important to note that due to the fact that these are startups, the distribution tends to be a bit skewed, with the majority of them having a smaller number of people in total, between 2 and 5.

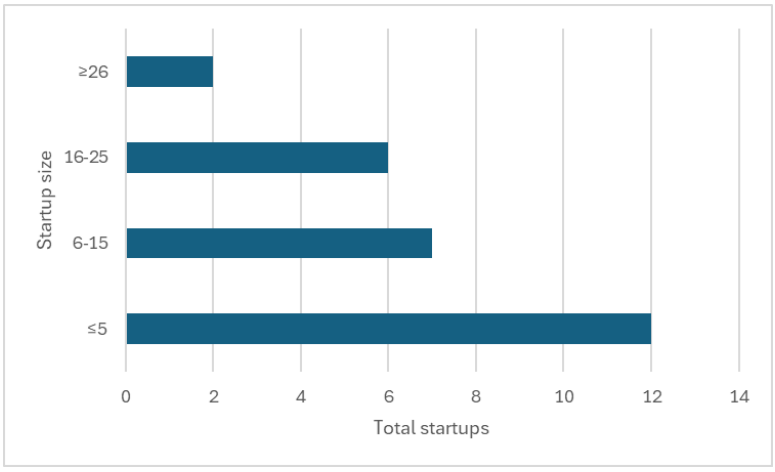

Fig. 1. Total number of members per startup.

Our study aims to establish correlations between three different key factors and methodologies employed by different startups: team size, leadership style, and investment. Similarly, we also seek to address how different methodologies can impact the success of different startups and how they change over the lifecycle of these startups.

3. Results

In these sections, we present some of the main answers that were provided to our questionnaire, as well as a potential interpretation of these answers.

3.1. Methodology and Team Size Correlation

The first part of the questionnaire is aimed at addressing the preferred methodology of each startup and their teams, to see how different methodologies align with different team sizes. This is aimed at determining if there exists some form of correlation between these two different factors of a startup.

Our research shows that the size of a startup's team has a big impact on the management methodology used. The distribution of methodologies reported by each respondent can be observed in Fig. 2.

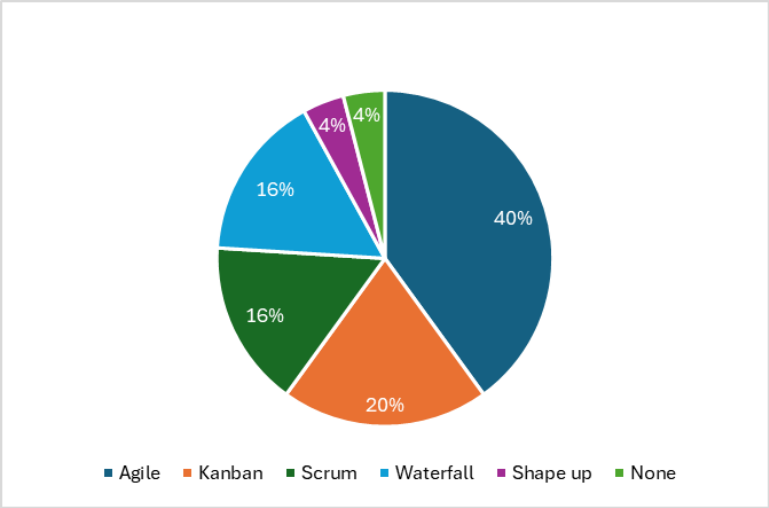

Fig. 2. Methodologies used by different startups

Small teams, or those with five or fewer members, tend to prefer Agile because it tends to be simple, flexible, and works well with informal communication. These teams can quickly make decisions and adapt to changes without needing heavy processes. As teams grow, they need more structure to stay organized. For medium-sized teams (5–15 members), representing 28% of respondents, Scrum is a popular choice because it uses sprint cycles, clear roles, and tools like Kanban boards to help manage tasks and keep everyone aligned. Larger teams (16 or more members), comprising around 32% of respondents, often switch to Waterfall or hybrid methods to deal with more complex projects. These methods provide clear workflows and better coordination, which are essential when managing many people and tasks.

3.2. Leadership Style Correlation

Another part of our questionnaire is aimed at establishing if there exists a correlation between the chosen leadership style and the respective chosen methodology.

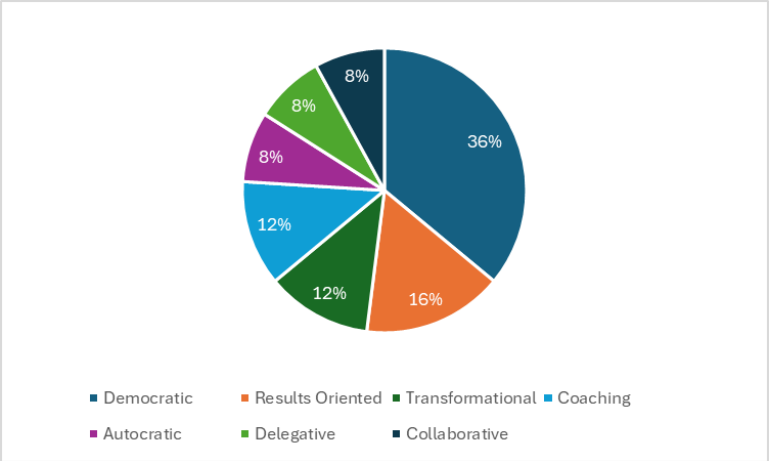

Fig. 3. Preferred leadership styles

Based on the data collected, the preferred leadership style within teams is overwhelmingly Democratic, with 36% of respondents selecting it, with other styles being similar to one another in numbers. It is important to note that all these styles were presented as options to choose from in our questionnaire, with no one selecting one of the options, which was Transactional. These findings can also be seen in Fig. 3.

The reasons provided by participants reveal clear patterns in how leadership styles influence their methodology choices:

- The Democratic style is strongly associated with Agile methodologies, reflecting its emphasis on collaboration, adaptability, and collective decision-making. Agile's iterative nature and ability to prioritize tasks align seamlessly with the democratic approach, empowering teams to contribute actively while adapting to dynamic environments.
- Results-Oriented leadership aligns closely with Scrum, given its structured focus on achieving measurable outcomes. Scrum's sprint-based framework enables leaders to break down large goals into manageable tasks with clear deadlines, ensuring accountability and steady progress.
- Autocratic leadership, characterized by centralized decision-making, is naturally suited to the Waterfall methodology. Waterfall's hierarchical structure and emphasis on predictability support leaders who prefer strict adherence to predefined plans and clear chains of command. This approach

is particularly effective for projects with fixed requirements and minimal flexibility.

For styles with lower adoption rates, the associations are more straightforward. Transformational leaders gravitate toward Kanban due to its flexibility and focus on continuous improvement. Coaching leadership aligns with Agile or Scrum, as these methodologies foster mentorship and personal growth. Delegative leadership pairs with Kanban or Agile for their adaptability and autonomy. Collaborative leadership aligns with Agile or Kanban, emphasizing teamwork and shared responsibility.

3.3. Correlation between Investment and Methodology

A different part of our questionnaire was aimed at addressing the potential correlation between investors and the methodologies employed by startups. More specifically, how certain stakeholders might influence startups to provide clearer goals, communication, rapports, etc., and how all these factors can contribute to the initial methodology being changed.

Our study observed that 60% of respondents reported receiving financial investments during the early phase of their startups, while 40% did not. For those who received funding, the impact on their management strategy was profound. Many startups indicated that securing investments led to a shift from rapid execution and resource optimization, where founders were deeply involved in every aspect of the business, to more structured and scalable management practices.

A response from the study highlights how investor expectations, such as clear timelines and deliverables, prompt startups to adopt more formalized and structured methodologies, like Waterfall, for larger projects. The emphasis on meeting deadlines and tracking progress allows startups to provide clear updates to investors and ensures that large projects stay on track.

3.4. Methodology Adoption Based on Startup Lifecycle

From our research, it is evident that the choice of management methodology is closely linked to the startup's development stage, as well as the team size and project complexity. The responses indicate that the startup stage significantly influences the choice of methodology. In the early stages, Agile is preferred due to its speed and ease of implementation. As teams and project complexity grow, there is a transition towards more structured methodologies, such as Scrum or even Waterfall. Many respondents started with simple methodologies like Agile to maximize speed and flexibility. As their teams grew, they introduced more formal structures, such as sprint planning, clearer role definitions, or even integrating Waterfall elements for complex projects. After receiving investments, management methods evolved toward more well-defined processes, including clearer metrics and reporting to meet investor expectations.

4. Discussion

In this section, we present the findings of our study and analyze some of its implications. However, before we further discuss some of the results, It is important to note some of the limitations related to our study.

Firstly, it is the fact that we only questioned a total of 26 different persons, even if each was a representative from a different startup, this can introduce severe bias, and the questionnaire, with its 11 questions didn't account for treating outliers or dealing with such bias. Similarly, we also have an issue with the demographics and a responder bias. Here, most of the people that answered the form knew the authors, as such they tended to be on the younger side, with ages ranging between 25-40 years. Similarly, most of the startups that took part in our study operate in Bucharest, as such it is harder to say how they might extend to other cities for which the conditions of success might differ. All of these points bias the results to several degrees, as we perform a purposive sampling, while not necessarily invalidating them, for the future a more inclusive study which takes into account a wider variety of companies, as well as more people answering for each company, and a more tailored questionnaire should be constructed in order to guarantee the results are stronger correlated with the reality at hand.

4.1. Methodology and Team Size Correlation

Research shows that Agile methodologies emphasize frequent communication, collaboration, and interaction among team members. To meet these requirements effectively, Agile teams are generally small and collocated. Smaller team sizes facilitate better coordination and enable the implementation of practices such as pair programming, daily stand-ups, and frequent feedback loops. In larger teams, communication becomes more complex, and the collaborative nature of Agile practices may face significant challenges, potentially reducing overall efficiency. In these cases, traditional methodologies such as the Waterfall model are better suited because they rely on hierarchical structures and well-defined workflows [22].

Vijayasarathy and Butler [23] note that there exists a correlation between the number of teams and team size and the chosen development methodology. Their findings indicate that 69.8% of Agile projects used small teams (10 or fewer members), and 80% of iterative projects used small teams. In contrast, traditional methodologies, such as the Waterfall model, tend to involve larger teams. For traditional projects, 61.1% of the teams were of medium size (11–30 members), 29.6% were large, and only 9.3% had small teams.

However, Livermore [24] suggests that there was no significant correlation between team size and the success of implementing Agile methodologies. This finding indicates that team size may not be as crucial as previously thought when it

comes to achieving successful Agile implementation. Even larger teams can still successfully adopt Agile methods, as long as they implement strategies to facilitate communication and collaboration, such as using communication tools or breaking the team into smaller sub-teams.

Our findings tend to be more in line with the existence of some correlation between team size and the chosen methodology, though its significance is hard to gauge due to the limited sample size.

4.2. Leadership Style Correlation

Gren and Ralph [25], in their study on effective leadership in Agile development teams, showcase that Agile leadership tends to be inherently collaborative, with an emphasis on empowering team members and collaborative decision-making. These findings align with our observations that Agile's iterative and flexible nature tends to align with a Democratic leadership approach, as indicated by most of the respondents in our study, both as the preferred methodology and preferred leadership style. The collaborative style also closely integrates into this category.

Similarly, studies such as those by Yang, Huff, and Strode [26] show that when comparing Agile with more traditional project management methodologies, such as Waterfall, leadership styles that follow a clearer line of command and control tend to be more prevalent, such as Autocratic. Kaur [27] also supports these findings. In a similar manner, our results resonate with these assumptions, showing a correlation between the Waterfall methodology and Autocratic leadership styles.

Holtzhausen and de Klerk [28] mention the idea of "servant leadership" in the Scrum methodology, where the leadership approach is to guide and encourage team members, leading to higher effectiveness. This aligns with our observations that the coaching style tends to be more suited for Agile or Scrum methodologies.

Similarly, MacLeod [29] and Foegen [30] mention the idea of Specific, Measurable, Achievable, Realistic, and Timely goals (SMART), and how they align with Agile-like methodologies. Our study also shows that Results-Oriented approaches tend to be preferred in the setting of Agile or Scrum methodologies.

The rest of our correlations tend to be a bit more limited, such as Delegative or Transformational gravitating more toward Kanban. These are the responses that were the sparsest in nature as well, so these observations should be taken with a grain of salt, as the literature regarding these findings is also limited.

4.3. Correlation between Investment and Methodology

Existing research shows that initial funding provides critical resources required to develop a product and bring it to market more rapidly, but it also introduces external pressures that influence many management choices. Research by CB Insights [10] highlights that 38% of startup failures stem from financial

mismanagement, emphasizing the necessity of strategic planning post-investment. Similarly, Harvard Business School Online [31] finds that rapid scaling without structured planning can lead to inefficiencies and increase the potential risk of technical debt. Our findings align with these insights, as respondents who received funding emphasized the need for structured methodologies in order to balance growth and sustainability.

In a similar fashion, investors also push for management decisions that ensure accountability and transparency. According to Propulsion Tech Journal [32], investors frequently encourage startups to adopt Agile methodologies due to their iterative development cycles, adaptability, and real-time feedback mechanisms. Our findings corroborate with this, as some participants mentioned shifting to Agile or Scrum methodologies in response to investor demands for measurable progress and responsiveness to market needs.

However, not all startups default to Agile. Some respondents noted that expectations for clear timelines and deliverables led them to adopt more structured methodologies, such as Waterfall, particularly for large-scale projects where milestone tracking becomes critical. This observation aligns with studies indicating that startups often move toward hybrid approaches post-investment, combining the flexibility of Agile with the structured planning of Waterfall [13][21].

Furthermore, one of the major risks that arise due to investor pressure is premature scaling. Startup Genome [33] reports that 70% of failures stem from this issue. To mitigate such risks, research underscores the importance of leveraging investor networks and obtaining expert guidance during post-investment growth [34][35]. In the case of our study, we don't have responses that directly correlate with these findings, possibly due to our low sample size, the startups not having failed yet, or respondents not finding this topic relevant to disclose.

4.4. Methodology based on Startup Lifecycle

Software startups operate in dynamic environments characterized by uncertainty and rapid change. To navigate these challenges, many adopt Agile and Lean methodologies, known for their flexibility and iterative development processes. A study analyzing software development practices in startups found that Agile and Lean methodologies are the most commonly used due to their adaptable nature, which aligns well with the fast-paced startup context [17]. Nevertheless, our data shows that 16% of respondents use the Waterfall methodology for "a well-defined process," required by their clients. This trend is consistent with broader industry findings, where comparative analyses have shown that while Agile frameworks dominate, Waterfall remains relevant in scenarios demanding clear structure and documentation [36].

The adoption of Agile methodologies has been linked to several benefits:

- Enhanced Product Quality: Iterative development allows for continuous testing and refinement, leading to more robust products.
- Improved Customer Satisfaction: Regular customer feedback integration ensures the product meets market needs.
- Increased Team Collaboration: Agile practices promote cross-functional teamwork, enhancing productivity.

For instance, a case study on successful software development projects highlighted that startups leveraging Agile methodologies could accelerate development timelines and respond more effectively to market demands [34].

However, it is important to note that the mere adoption of Agile or Lean practices doesn't guarantee success. Startups often tailor these methodologies to fit their unique contexts, selectively implementing practices that align with their specific needs and constraints. This customization is crucial, as rigid adherence without adaptation can lead to misalignment with the startup's goals and challenges [35].

4.5. Absence of Modern Methodologies

While methodologies such as Lean Startup, DevOps, and Design Thinking are frequently highlighted in academic and industry literature as effective tools for early-stage software startups, none of the respondents reported actively using them. These methodologies are often associated with innovation-focused practices like rapid prototyping, continuous deployment, and user-centered design. Their absence in our sample may reflect a preference for more familiar or structured approaches within the Romanian startup ecosystem, or possibly a lack of awareness or perceived applicability among smaller teams.

This observation highlights a potential gap between emerging management trends and practical adoption within local startup environments. It is possible that these methods are either underutilized, misunderstood, or simply not yet prioritized by early-stage companies in this context. Future research involving a broader and more diverse sample could help determine whether this pattern is consistent across other regions or industries. Additionally, exploring the reasons behind the limited uptake of these modern methodologies could offer valuable insight into how startup teams select and adapt their management practices.

5. Conclusions

The research highlights the importance of adaptability, strategic foresight, and effective resource allocation in navigating the dynamic and high-risk environment of startups. By analyzing various methodologies such as Agile, Scrum, Kanban, Waterfall, and hybrid approaches, this study offers several critical insights into their applicability across different stages of a startup's lifecycle.

Some key notes are that in the early stages, Agile and Lean methodologies tend to dominate, providing the necessary flexibility and iterative processes necessary for rapid prototyping and market validation. As they grow, more structured methodologies like Scrum or hybrid models become essential to manage complexity, scale operations, and maintain team alignment. Mature startups benefit from traditional methodologies such as Waterfall for projects requiring high levels of predictability and regulatory compliance, while still leveraging Agile for ongoing development. Additionally, external investments tend to significantly influence management practices, with funding driving rapid execution and the need to introduce structured processes, transparency, and accountability in order to meet investor expectations.

On a similar note, a strong correlation can be noticed between the team size and management style, with smaller teams benefiting from Agile-based methodologies due to simplicity and adaptability. On the other hand, larger teams tend to prefer the clarity and structure offered by Waterfall or hybrid methods. Additionally, democratic and transformational leadership styles align well with collaborative and iterative methodologies, fostering innovation and team empowerment.

This study also underlines the importance of continuously evaluating and adapting management methodologies to better align with organizational growth and external demands, leveraging external expertise, as well as balancing scalability and innovation by potentially adopting hybrid methodologies. By integrating these practices, startups can help enhance their resilience, scalability, and long-term sustainability, thereby increasing their likelihood of success in competitive markets.

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