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Conference Paper · September 2023

DOI: 10.1109/REW57809.2023.00073

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The Hidden Costs of Ignoring Cash Flow: A Call for Strategic Requirements Prioritization at Startups during an Era of Rising Interest Rates.

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Abstract— Cash flow management, a key factor in 82% of startup failures, has surprisingly only been referenced once as a criterion for Requirements Prioritization (RP) in a 1983 study. Only 5 studies have been identified that consider one or more financial ratios during RP. Therefore it's fair to state that this type of RP criteria is underrepresented. The current financial climate is marked by a steady rise in interest rates the past two years, reaching a peak unseen in previous decade. Consequently, investors have become more discerning, no longer investing hastily into software startups at the first glimpse of traction or user growth. There is a renewed emphasis on financial health. Therefore adept cash flow management is top of mind again as a pivotal consideration by private equity investors. Should startups persist in their currently employed RP criteria, the 63% failure rate is set to rise due to funding difficulties tied to an overemphasis on growth and user value, rather than cash flow as RP criterion. To address this, future research should aim to evolve prioritization methods to enhance early-stage decision-making and increase startup success rates. This study not only has practical implications for startups but also paves the way for further collaborative academic research in Requirements Engineering (RE) and contributes to the creation of the first academically supported Pragmatic Framework for Product Managers (PFPM) at Software Startups.

Keywords— Startups, Requirements Engineering, RE, Cash Flow, Requirements Selection, Requirements Prioritization, Failure, Private Equity, PE, Venture Capital, VC

I. INTRODUCTION

Software startups, notorious for their high-pace, uncertainty, and resource limitations [1], face numerous challenges, including premature scaling, cash flow mismanagement (82%), difficulties in obtaining investment (47%) [2, 3], and simply running out of funds (21 to 44%) [4, 5]. The failure rate stands at 63% [5], with 25% occurring in their first year [6]. The situation is aggravated by an overemphasis on feature-heavy, slow to market [6] Minimum Viable Products (MVP) without clear business strategy or user traction [1].

These startups often do insufficient market research or business case analysis [2], leading to inefficient requirements selection process [7], misallocation of critical resources [8], and an over-commitment to solutions that do not meet market needs [9]. Consequently, they face the risk of not achieving product-market fit [8], and struggle with acquiring their first paying customers [1], putting the startup's runway (number of months a company has left until cash runs out) at risk and therefore probability of success.

Cash flow management, strategic planning, and efficient resource allocation are thus critical for startup survival. Improving early product [10] decision-making, especially requirements selection and prioritization, could significantly [11] influence future performance [12, 13]. The current financial climate is marked by steadily rising interest rates over the past two years, reaching a peak (Figure 1) unseen in the previous decade [14, 15], making it harder for startups to secure debt capital. This forces startups to look into alternatives such as private equity funding or merger and acquisition strategies [16], which also get increasingly harder due to the rising interest rates.



Figure 1: International interest rates (ECB, FED), 05/2013-05/2023

II. IMPACT OF INTEREST RATES

Increasing interest rates have steered investors towards alternatives to venture capital funds [18], impacting equity fundraising and the emergence of startup unicorns [17]. The number of equity fundraising deals in the United States has decreased in 2021 by 76.56% [18], with Europe seeing a 92.26% decline [19]. As a result, the funds available for allocation to startups have become increasingly scarce [16], exacerbating the already challenging task of initial funding acquisition for software startups [1].

The era before the interest rate rise (2017-2022) witnessed a surge, going from 20 to 210 new startup unicorns per quarter. However, with the rise in interest rates, this number experienced a correction [17], amplifying startups' fundraising challenges [16, 18, 19]. As a result, investors are focusing more on profitability and cash-driven metrics such internal rate of return (IRR), the net present value (NPV) [20] and recurring dividend payments [21] instead of being reduced by mere user growth. In an economic context characterized by a liquidity crunch [21], favors the investor [22], and will push even more early-stage ventures out of business.

III. RELATED WORK

A. Requirements Prioritization criteria for startups

Svahnberg, Gorschek [23] and Hujainah, Bakar [12] have each contributed significantly to the understanding of the diversity of criteria and techniques associated with Requirements Prioritization (RP). Together, they have documented over a hundred distinct criteria and techniques. Although, considering the broader academic literature [24], it is notable that only a scarce few of these papers delve into the context of startups, with a mere three papers identified (see Table 1).

Paper	Summary
Tripathi, Klotins [25]	The main identified RP criteria are: Value to customer/product/company/shareholders (38,7%), Time to implement (17,8%), Cost to implement (13,5%) and Effort to implement (13,5%). In 84% of the cases the value to the customer is mentioned.
Melegati, Goldman [26]	Startup teams mention the following RP criteria: firm strategy, need to demonstrate product, value to the user, prevent other teams from blocking, essential features, high priority situation like critical bugs and cost-effective analysis.
Albuga and Odeh [27]	Framework considering four quadrants where a distinction gets made between core and supplementary requirements and taking them in scope or not. Only the value for the customer gets considered as RP criteria.

Table 1: RP criteria in a startup context

B. Financial Requirements Prioritization criteria

Financial ratios like ROI, IRR, and payback period [28], and NPV [29], are critical, but often overlooked, in startups' requirements prioritization (RP). However, not all cash flows are identical, and the temporal aspect of cash flow in startups is critical. The review of literature [24] spanning 40 years reveals that cash flow analysis as an RP criterion has been referenced only once [30], indicating a gap in academic research regarding cash flow analysis in RP, especially for startups. Table 2 provides a summary of the studies that discuss the limited papers which consider any financial ratio as part of the RP criteria.

Paper	Financial ratio
Boehm [31]	Return on investment (ROI)
Svensson, Gorschek [32]	Return on investment (ROI)
Cleland-Huang and Denne [29]	Net present value (NPV)
Cooper [33]	Payback period
Bekkers, Weerd [34]	Return on investment (ROI)
Fogelström, Barney [35]	Return on investment (ROI)
Corchola [28]	Return on investment (ROI), Internal
dorcheis [28]	rate of return (IRR), Payback period
Cosse and Swan [30]	Cash flow analysis
Guyon and Elisseeff [36]	Break-even point
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Table 2: Financial RP criteria

C. Requirements Prioritization methods for startups

Startups need to choose their RP methods wisely, as not all are well-suited for startup environments. Although Analytical Hierarchical Process (AHP) [37] is widely recognized, it's deemed slow [38, 39], complex [40] and too time-consuming [40] for startups. Table 3 outlines potentially viable RP methods for startups.

Method	Why	
14/im 14/im	Interesting for a small group of stakeholders [38] and	
win-win	number of requirements [38].	
Tonton	Interesting for a small group of stakeholders [38] and	
Top ten	number of requirements [38], while also being very	
requirements	easy to use [41].	
¢100 allocation	Interesting [42] for a small group of stakeholders	
	[38] and number of requirements [38, 43], while also	
(culturative	being easy [44], fast [43, 44] and accurate [39], while	
voting)	also being consistent with high user confidence [44].	
Round-the-group	Interesting [42, 45] for a small group of stakeholders	
prioritization	[38] and number of requirements [38, 46].	
Planning Game	Is considered one of the fastest [38] and easiest and	
	scalable [39] methods.	
Ding nong balls	Interesting for a small group of stakeholders [38] and	
Fing polig balls	number of requirements [38, 46].	
Multi-voting	Interesting [42, 45] for a small group of stakeholders	
system	[38, 46] and number of requirements [38, 46].	
Dot voting	Interesting [42] for a small group of stakeholders	
Dot voting	[38] and number of requirements [38].	
Weighted critical	Interesting for small scale analysis [42, 45].	
analysis		
Quality functional	Interesting for small scale analysis [42, 45].	
development		
Weiger's matrix	Interesting for small scale analysis [40].	
approacn		
Numerical	very easy, and takes into account time and risk	
assignment	Variables [41].	
Ranking	Very easy for practitioners [39, 41], while also being	
-	fast and consistent with high user confidence [44].	
	Average in speed, but good for a small set of	
Bubble sort	requirements [43] in terms of reliability and ease of	
	use [39].	
NosCow	Considered the easiest method [39].	

Table 3: RP methods for startups

IV. SUMMARY

The current economic landscape, characterized by rising interest rates, has fundamentally altered the requirements prioritization (RP) paradigm for startups. This shift demands a fresh perspective in academic discourse that accounts for these new economic conditions. Key to this new perspective is the incorporation of financial ratios into RP methodologies, with a particular focus on cash flow analysis, net present value (NPV), return on investment (ROI), internal rate of return (IRR), break-even analysis, and payback period analysis.

V. RESEARCH AGENDA

Despite the essential role cash flow analysis plays in the startup context, existing research has not adequately addressed this aspect. The unique challenges faced by startups, such as the temporal nature of cash flow and the implications of payment delays, are currently underrepresented in RP literature. Given the critical role of the Product Manager (PM) in navigating these challenges, this study aims to address this literature gap by posing several research questions:

RQ1: What will happen with the failure rate of software startups when interest rates increase, considering current requirements prioritization processes are kept all equal?

RQ2: What are the most used requirements prioritization criteria in the academic literature, and which ones are the most appropriate for a software startup context?

RQ3: What requirements prioritization criteria show the most promise to improve decision-making at software startups in an economic context with higher interest rates?

RQ4: What would a startup context focused requirements prioritization, including the most optimal variables look like?

To answer these questions, we propose the following future research steps: 1) a literature review to identify variables pertinent to RP in startup literature, 2) a study (literature review or expert judgment) to identify which RP methods are most effective in a startup context, and 3) combining the insights from steps one and two to refine an RP method that is finely tuned to the startup context. This method will then be validated through mathematical modeling, simulations, or other suitable methodologies, before being tested on real-world startup case studies.

This research is expected to contribute significantly to the refinement of the Pragmatic Framework for Product Managers (PFPM) at Software Startups [47]. This framework aims to establish an academically validated product management methodology specifically tailored for startups. As part of an ongoing Structured Literature Review [24], 122 PM related activities across seven domains have been identified, with RP likely being a central part of this framework. The goal is to reduce and improve upon these activities, taking into account the specific needs of startups, thus improving early-stage decision-making and potentially increasing startup survival rates, particularly in the face of rising interest rates.

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