

RISK MANAGEMENT IN A STARTUP

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Abstract

Startups operate in highly uncertain environments due to their focus on developing innovative products and technologies, which exposes them to significant financial, market, operational, technological, and regulatory risks. Although startups have the potential for high profitability and success, failure rates remain high, particularly during the early stages, which are considered the most critical. Common causes of failure include insufficient financial resources, lack of product-market fit, and internal conflicts. This paper analyzes risk management in a technology-based startup developing an automated basketball scoring device. Key risks are identified and assessed using the risk matrix methodology. The findings indicate that the company faces risks typical of this type of business, with financial limitations being the most dominant. The study highlights the importance of integrating risk management into business strategy and regularly updating risk matrices to adapt to environmental changes. Effective risk management enhances resilience, reduces exposure, and increases the likelihood of sustainable growth and market success.

Keywords: *risk management, startups, innovation*

1. INTRODUCTION

The development of business strategies and project management in the 1980s, recognized that many projects exceeded deadlines, required more funds, and generally produced results that significantly differed from the initial forecasts. This highlighted the need to develop a structural approach to risk management. One study from that period indicates that many projects were completed almost within the planned timeframe, with an average delay of 17%, and costs that were significantly exceeded, on average by 88% (Venczel et al., 2024; Williams, 1995). Overlooking the unexpected circumstances during the planning phase was recognized as the primary cause of these increased costs and project delays. This points to the importance of risk management, since the risk is associated with almost all types of business. It implies the possibility of an unexpected event occurring, often with negative consequences for operations (Pukala et al., 2018).

Risk management is particularly important in startup companies, which face uncertainty in all segments of their business, especially in the early stages of development. At this point, it is essential to clearly define the business model and determine the product or service intended for the market. This phase is highly demanding, as it usually requires substantial investment and limited time to transform an idea into a sustainable venture (Berbegal-Mirabent, 2012). Startup nature, rooted in innovation and limited resources, makes them

especially vulnerable to market uncertainties, financial challenges, and technical obstacles (Cantamessa et al., 2018). Effective risk management is crucial, since it enables startups to turn potential threats into favorable circumstances (Gilinijov, 2024).

For these reasons, the following sections of this paper provide a more detailed analysis of the most significant risks faced by startups, as well as the methods and strategies that can be applied for their prevention and mitigation.

2. RISKS IN A STARTUP COMPANY

Various definitions of startups can be found in the literature; however, in this paper, will be used definition that the startup is “an organization designed to create new products or services under conditions of extreme uncertainty” (Ries, 2011). These companies cannot be classified into traditional categories of enterprises, as their operations are based on innovation and iterative learning to develop new products/services and identify viable business models (Vekić, 2022). By introducing novel solutions to the market, startups leverage innovation and adaptability, which gives them strong potential for rapid growth and high profitability. But, despite the potential they carry, a large number of startups fail to survive, and most collapse within the first five years of operation (Akter, 2020). Given the high failure rate and the experimental nature of startups, understanding risk, how it is perceived, and managed is essential for improving the survival strategies of these companies.

Risk is difficult to define precisely because it is viewed differently across various sciences and business domains, and its perception changes over time (Pukala et al., 2018). However, almost all definitions of risk include key elements such as uncertainty, exposure, and the possibility of loss. Risk represents the potential danger of losing something of value, which is why it is necessary to assess risks in terms of the likelihood of their occurrence and possible consequences (Panić & Živković, 2024). Risk in startups represents the potential danger of losing resources, time, or opportunities that hold value, which makes it crucial to evaluate the likelihood of undesirable events and their possible consequences (Dykha et al., 2023). Most startups fail to survive their first year, and data indicate that 9 out of 10 startups fail. The most common reason for failure is the lack of product-market fit (34%), while the second reason is insufficient financial resources (16%). Even if they survive the first year (around 20%), only a portion of these companies become profitable (Startup Failure Rate, 2025). In Serbia, 67% of startups that exist for up to three years are not profitable, and the biggest challenge is securing financial resources (Startup Scanner, 2025).

2.1. Specification of risk in a startup company

As previously mentioned, startups most often fail due to a combination of various factors that occur at different stages of development (Szathmári et al., 2024). The stages of startup development include ideation, validation, development, market entry, and finally, scaling. Risks are particularly significant in the early stages of development when searching for optimal product-market fit (Kumbhat, Sushil, 2018). This is one of the most common reasons for business failure, as it indicates that the product does not meet the real needs of users. In addition, other significant factors include:

- lack of financial resources to cover operational costs and further development,

- personal or team-related issues such as lack of experience, poor communication, or insufficient commitment, as well as
- technical challenges in developing and implementing technology.

These factors often intertwine and influence each other, so failure usually results from their combination rather than individual weaknesses (Szathmári et al., 2024). The following table presents the risks that most frequently occur at different stages of development.

Table 1. Key risks in different phases of startup development

Startup development phase	Key risks
Ideation	Unclear market need
Validation	Prototype did not confirm the need for the product/service
Development	Poor team coordination and resource management
Market entry	Misalignment with market needs
Scaling	Rapid expansion that threatens operational stability

As can be seen from the table, the most significant risks occur during the ideation and validation phases, since these stages are crucial for the business's survival. In these stages, startups face the highest market uncertainty, lack of resources, and unclear strategy, factors that often contribute to early failure. As the organization takes shape, risks shift toward internal challenges such as poor team coordination, inefficient management, and unfavorable financial decisions. In the market entry phase, the key risk is product misalignment with user needs, along with regulatory barriers and competition. During growth and scaling, threats arise from rapid expansion, financial instability, and loss of flexibility. This dynamic nature of risk requires startups to remain adaptable and continuously adjust their strategies to ensure successful transitions from one stage to another, prioritizing leadership and teamwork (Argaw & Liu, 2024). Understanding this progression of risks during development stages provides context for understanding the common causes of failure and reinforces the importance of risk management.

The most common causes of failure of startups are an incorrect or non-existent business model (35%), neglect of business development (28%), and depletion of financial resources (21%), along with additional factors such as lack of product-market fit, technical issues, poor team dynamics, and external challenges such as competition and regulatory barriers (Cantamessa et al., 2018). Risk management is crucial for identifying and controlling these factors that can secure the long-term survival of a startup in the market (Dykha et al., 2023).

2.2. Risk management in a startup

The failure rate of startups is quite high; therefore, the main goal of risk management in a startup is to ensure its survival in the market (Ikhasari & Faturohman, 2021). A startup's ability to identify risks on time and respond appropriately is crucial for business continuity (Schulte, 2025). To achieve this, it is essential to understand that risk management is not an isolated activity but a comprehensive approach that integrates risks into the business strategy. Coordinated risk management at the organizational level becomes a key predisposition for long-term success (Majdalawieh, 2021). Strategic risk management involves the systematic identification and control of threats that may sabotage the achievement of the company's long-term objectives (He, 2018). For this process to be effective, the following steps in risk management should be followed:

1. monitoring potential problems,
2. identifying and collecting information about risks,
3. assessing risks,
4. making decisions on strategy (acceptance, mitigation, elimination, or transfer), and
5. establishing a system for continuous monitoring (Ikhasari & Faturohman, 2021).

Full implementation of risk management in startups enables not only risk avoidance but also active risk handling in line with strategic objectives. This approach is particularly important in the early stages of development when strategic decisions can have long-term consequences (Yin, 2023). In addition, since finances are one of the main reasons for startups failing, timely securing of financial resources and efficient resource management are crucial for securing business continuity (Schulte, 2025).

However, internal risk management alone is not sufficient. In today's business environment, strategic partnerships represent an important mechanism for overcoming the complex challenges startups face. Collaboration with academic institutions, industry leaders, and the public sector provides access to expertise, financial resources, and regulatory knowledge, accelerating product development and increasing the likelihood of successful market entry (Hussein et al., 2025). This includes establishing clear risk management protocols, conducting thorough market research to confirm product-market fit, and rigorous product testing to meet regulatory requirements. This strategic approach reduces the risk of costly mistakes and strengthens the startup's resilience to unforeseen challenges.

3. METHODOLOGY

In this paper, the risks are analyzed in a startup company engaged in the development of a device for automatic basket counting and holding a patent for a ball-return device. The company uses computer vision and advanced technologies for model development. Based on the observation of business processes and the challenges faced by the startup, a significant number of risks and a high level of uncertainty were identified. For risk assessment, the risk matrix methodology was used, chosen for its simplicity and intuitiveness, as well as its wide application in evaluating and ranking risks in projects.

3.1. Risk matrix

Risk matrix is a widely used tool for assessing and ranking risks based on their likelihood of occurrence and impact on the project (Acebes, 2024). Their widespread use across various sectors confirms that they are a flexible and practical tool, particularly useful for initial identification and ranking of risks (Elmontsri, 2014). Risk matrix have two key applications: making decisions about risk acceptance and determining priorities, i.e., identifying which risk should be addressed first (Duijm, 2015). A representation of the risk matrix is provided in the following table, while Table 3 contains an overview of risk acceptability levels.

Table 2. Risk matrix (Grozdanović, 2013)

Circumstances/ Occurance	Catastrophic (1)	Critical (2)	Marginal (3)	Insignificant (4)
A (Frequent)	1A	2A	3A	4A
B (Probable)	1B	2B	3B	4B
C (Occasional)	1C	2C	3C	4C
D (Rare)	1D	2D	3D	4D
E (Improbable)	1E	2E	3E	4E

Table 3. Ranking of the risks (Grozdanović, 2013)

Risk Combinations	Category
1A, 1B, 1C, 2A, 2B, 3A	Unacceptable
1D, 2C, 2D, 3B, 3C	Major
1E, 2E, 3D, 3E, 4A, 4B	Medium
1E, 2E, 3D, 3E, 4A, 4B	Minor

Finally, according to the obtained scores, risks are prioritized based on their values. This is a crucial step to identify those risks that require immediate intervention, while less significant risks can be postponed. Ultimately, plans for risk mitigation and management are developed. Once formed, the risk matrix should be periodically reviewed to incorporate necessary updates and adjustments (Pascarella et al., 2021).

3.2. Risk matrix in a startup

A combined approach was used for risk identification, which included observing business processes, analyzing historical data, and conducting unstructured interviews with founders. Based on the collected information, key risk categories were defined: financial risks, which have the greatest impact on the operations of this type of company; technological risks; risks related to potential regulatory changes; market risks; and operational risks. In addition to these, safety risks were also examined. All identified risks, grouped into categories, are presented in Table 4.

Table 4. Identified risks in a startup company

Risk category	Risk
Technological risk	The developed computer vision model requires intensive training and testing, delaying market entry.
	Failure in prototype development.
Financial risk	Economic crises affect prices and availability.
	Hardware development creates unexpected costs.
Operational risk	Lack of financial, technical, or human resources may slow development and create pressure on the team.
	Supplier issues: shortage of parts, incorrect deliveries, or poor-quality components for the device.
	Problems in transportation and logistics from foreign suppliers.
	Team disagreements slow down processes.
Market risk	Underdeveloped market in Serbia.
	Barriers to entry and market expansion beyond Serbia's borders.

	Competition and technology copying.
Regulatory risk	Compliance with domestic and international regulations.
Safety risk	User safety compromised.

After identifying the risks, their likelihood of occurrence and potential impact on the business were assessed. The risks were classified according to the matrices shown in Tables 2 and 3, where frequency was rated on a scale from A (frequent) to E (rare), and consequences on a scale from 1 (catastrophic) to 4 (insignificant). Based on the conducted analysis and assessment, measures for mitigating or eliminating the identified risks were defined.

4. RESULTS AND DISCUSSION

Based on the analysis, it was determined that the greatest concern in the company is related to the shortage of financial resources, along with limited human and material resources. These risks are typical for this type of business, and although efforts are being made to mitigate them, the key weakness remains financial stability. Table 5 presents the identified risks, their ranking, and proposed mitigation measures, many of which are already being implemented in practice.

Table 5. Identified risks and their ratings

Risk	Probability of occurrence	Circumstances	Risk management
The developed computer vision model requires intensive training and testing, delaying market entry.	C	2	Securing adequate technology and engaging experts.
Failure in prototype development.	D	1	
Economic crises affect prices and availability.	B	2	Regular monitoring of domestic and foreign markets and prices, as well as global developments.
Hardware development creates unexpected costs.	B	2	- Dynamic budget monitoring and rebalancing to reduce costs and optimize operations. -Partial payments.
Lack of financial, technical, or human resources may slow development and create pressure on the team.	C	2	Forecasting, projections, and project adaptation.
Supplier issues: shortage of parts, incorrect deliveries, or poor-quality components for the device.	D	3	-Regular communication with domestic and foreign suppliers. -Market research and creating a supplier list that is regularly updated.
Problems in transportation and logistics from foreign suppliers.	D	3	
Team disagreements slow down processes.	C	3	Developing a business culture and effective internal communication.
Underdeveloped market in Serbia.	B	2	-Engaging business consultants. -Thorough market research. -Preparing high-quality marketing
Barriers to entry and	B	1	

market expansion beyond Serbia's borders.			materials.
Competition and technology copying.	B	2	Patenting the technology.
Compliance with domestic and international regulations.	B	2	-Securing legal assistance to ensure regulatory compliance. -Regular monitoring of regulatory changes.
User safety compromised.	D	1	-Device safety certification. -Regular inspection of structural safety.

Risk management strategies proposed in the table emphasize proactive marketing monitoring and communication, both within the team and with external stakeholders. The company has a strong technological foundation, which is already in the patenting process, and maintains collaboration with a university that provides access to equipment, expert staff, and students. These partnerships help reduce risks and support business continuity. Since financial challenges remain a major concern, recommended measures include timely tracking of available grants and funding programs, as well as securing strategic partnerships and investment opportunities.

The following table presents the matrix of identified risks. This visual representation enables easier observation of critical zones, identification of priorities for risk management, and decision-making regarding appropriate mitigation measures.

Table 6. Risk matrix

Circumstances/ Occurrence	Catastrophic (1)	Critical (2)	Marginal (3)	Insignificant (4)
A (Frequent)				
B (Probable)	1	5		
C (Occasional)		2	1	
D (Rare)	1		2	
E (Improbable)				

Based on the analysis of the risk matrix and the data from the table, it can be concluded that the majority of risks fall into category B2, which are probable with critical consequences. This zone includes financial, market, and regulatory risks, indicating the need for priority management of these factors. Their frequency and significant impact on the project make them crucial for continuous monitoring and implementation of mitigation measures, such as market monitoring, budget rebalancing, and legal compliance. Other notable categories are C2 (critical but occasional) and D3 (marginal, but rare), which mainly cover technological and operational risks. These risks could also be found in categories C3 and D3, proposing their significant impact, but low chances of occurrence.

Additionally, operational risks in zone D3 and technological risks in D1, although rare, can lead to severe consequences, such as prototype failure. This underscores the critical need to minimize these risks by securing appropriate technology and implementing contingency plans, including establishing alternative suppliers. Risks in zone B1 represent strategic challenges for business development, such as barriers to entering foreign markets. These are considered probable, and their potential impact, influenced by regulatory changes or failed market entry, can severely limit growth. Engaging experienced business consultants and conducting comprehensive market research can significantly reduce this risk, ensuring informed decision-making and minimizing exposure to uncertainty.

Risk management in this company combines preventive and corrective measures to reduce the likelihood and mitigate the impact of identified risks. Many of these actions are already in place, forming a solid framework that not only lowers risk exposure, but also strengthens resilience and supports long-term business sustainability.

5. CONCLUSION

Startup companies operate in a high-risk environment because they develop innovative products and technologies, which makes them particularly vulnerable to market uncertainties and changes in the business environment. Statistics show that the failure rate of startups is high, and the most common reasons for failure include financial problems, lack of product-market fit, technical difficulties, poor team dynamics, and external challenges such as competition and regulatory barriers. In this context, risk management emerges as a key activity for the survival and long-term development of startups. Effective identification, assessment, and mitigation of risks reduces the likelihood of their occurrence and minimizes their consequences, thereby increasing business stability and chances of success.

In the analyzed startup, financial, market, and operational risks emerged as the most significant, while technological and regulatory risks were also identified as important factors influencing business success. The results show that effective risk management, through a combination of preventive and corrective measures, enables reducing the likelihood of occurrence and mitigating the consequences of these risks. Continuous market monitoring, cost optimization, improvement of internal communication, and timely response to regulatory changes are particularly important. Implementing these measures not only reduces exposure to risks but also increases the competitiveness and stability of the startup in the market. In the future, regular updates of the risk matrix and adaptation of management strategies to changes in the environment will be crucial for long-term success and business sustainability.

UPRAVLJANJE RIZICIMA U STARTAPU

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Abstract

Startapi posluju u veoma neizvesnom okruženju zbog svoje usmerenosti na razvoj inovativnih proizvoda i tehnologija, što ih izlaže značajnim finansijskim, tržišnim, operativnim, tehnološkim i regulatornim rizicima. Iako startapi imaju potencijal za ostvarivanje visoke profitabilnosti i uspeha, stopa njihovog neuspeha i dalje je visoka, naročito u ranim fazama razvoja koje se smatraju najkritičnijim. Najčešći uzroci neuspeha uključuju nedostatak finansijskih resursa, neusklađenost proizvoda sa potrebama tržišta i interne konflikte. U ovom radu analizirano je upravljanje rizicima u tehnološki orijentisanom startapu koji razvija automatizovani uređaj za vođenje rezultata u košarci. Ključni rizici identifikovani su i procenjeni primenom metodologije matrice rizika. Rezultati ukazuju da se kompanija suočava sa rizicima karakterističnim za ovu vrstu poslovanja, pri čemu su finansijska ograničenja najizraženija. Studija naglašava značaj integrisanja upravljanja rizicima u poslovnu strategiju, kao i redovnog ažuriranja matrica rizika radi prilagođavanja promenama u okruženju. Efikasno upravljanje rizicima povećava otpornost organizacije, smanjuje izloženost rizicima i povećava verovatnoću održivog rasta i tržišnog uspeha.

Ključne reči: upravljanje rizicima, startapi, inovacije

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