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**Crowdfunding and start up financing**

**By**

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## Abstract in Greek

Η χρηματοδότηση μέσω crowdfunding έχει επιφέρει σημαντικές αλλαγές στο τοπίο της χρηματοδότησης νεοφυών επιχειρήσεων, δημιουργώντας ίσες ευκαιρίες πρόσβασης σε κεφάλαιο και επιτρέποντας στους επιχειρηματίες να προσεγγίσουν ένα ευρύ κοινό δυνητικών επενδυτών. Η παρούσα διπλωματική εργασία εξετάζει το ρόλο του crowdfunding ως μέθοδο χρηματοδότησης νεοφυών επιχειρήσεων, με έμφαση στη διαφάνεια, την ασφάλεια και την αποτελεσματικότητα, αναλύοντας τόσο ποσοτικά όσο και ποιοτικά δεδομένα από διακεκριμένες πλατφόρμες crowdfunding. Η μελέτη χρησιμοποιεί μια μικτή μεθοδολογία, συνδυάζοντας desktop research, ανάλυση δεδομένων με τη χρήση Excel και Python και μελέτες περίπτωσης για τον προσδιορισμό μοτίβων στον χώρο του crowdfunding.

Η εμπειρική ανάλυση, βασισμένη σε δεδομένα από το Kickstarter που καλύπτουν την περίοδο από την έναρξη λειτουργίας της πλατφόρμας το 2009 έως τις 23 Νοεμβρίου 2023, φανερώνει τάσεις σχετικά με την απόδοση των διαφορετικών κατηγοριών έργων στον χώρο του crowdfunding. Κατηγορίες όπως τα Παιχνίδια (Games) και η Σχεδίαση (Design) φαίνεται να προσελκύουν ευκολότερα χρηματοδότηση, ενώ οι κατηγορίες Τεχνολογία (Technology) και Δημοσιογραφία (Journalism) αντιμετωπίζουν μεγαλύτερες προκλήσεις στο να επιτύχουν τους στόχους χρηματοδότησής τους. Η μελέτη παρουσιάζει ένα συνολικό ποσοστό επιτυχίας, συμπεριλαμβανομένων όλων των κατηγοριών, της τάξεως του 41%, ενώ παρατηρείται μια αξιοσημείωτη διακύμανση στα ποσά χρηματοδότησης και τις πιθανότητες επιτυχίας ανάμεσα στις διαφορετικές κατηγορίες. Επιπλέον, διαπιστώθηκε ασθενής συσχέτιση μεταξύ του συνολικού ύψους χρηματοδότησης και του ποσοστού επιτυχίας ανά κατηγορία, υποδηλώνοντας ότι οι όγκοι χρηματοδότησης δεν συνδέονται απαραίτητα υψηλότερη πιθανότητα επιτυχίας.

Επιπρόσθετα, η μελέτη περιπτώσεων επιτυχημένων εκστρατειών της πλατφόρμας Seedrs, τονίζει τη σημασία της διαφανούς επικοινωνίας, του στρατηγικού σχεδιασμού της καμπάνιας και της ισχυρής συμμετοχής της κοινότητας στην επιτυχία των εγχειρημάτων crowdfunding. Οι startups που διατηρούν αποτελεσματικά κανάλια επικοινωνίας με τους χρηματοδότες τους και επιλέγουν πλατφόρμες που συνάδουν με τους στρατηγικούς τους στόχους έχουν μεγαλύτερη πιθανότητα επιτυχίας. Η έρευνα επισημαίνει επίσης την ποικιλομορφία των διαθέσιμων μοντέλων crowdfunding, ανάλογα με τις συγκεκριμένες ανάγκες της κάθε καμπάνιας, και τονίζει τον καθοριστικό ρόλο της τεχνολογίας blockchain στην ενίσχυση της διαφάνειας και της ασφάλειας στον τομέα του crowdfunding.

Συμπερασματικά, η διπλωματική αυτή εργασία υποστηρίζει ότι παρόλο που το crowdfunding προσφέρει μια αποδοτική και προσιτή επιλογή για τις startups ώστε εξασφαλίσουν χρηματοδότηση, η επιτυχία τέτοιων εγχειρημάτων εξαρτάται σημαντικά από την επιδέξια διαχείριση της καμπάνιας και την κατανόηση των δυναμικών της αγοράς.



## **Abstract**

Crowdfunding has revolutionized the landscape of startup financing by democratizing access to capital, thereby enabling entrepreneurs to engage a wide audience of potential backers. This thesis explores the role of crowdfunding as a method for startup financing, with an emphasis on transparency, security, and efficiency, by examining both quantitative and qualitative data from prominent crowdfunding platforms. The study employs a mixed-method approach, integrating desktop research, data analysis using Excel and Python, and case studies to identify patterns and insights within the crowdfunding landscape.

The empirical analysis, leveraging data from Kickstarter since the launch of the platform in 2009 up to 23 November 2023, reveals insightful trends about the performance of different project categories within the crowdfunding landscape. It was observed that categories such as Games and Design have a higher propensity to attract funding, whereas Technology and Journalism exhibit more pronounced challenges in achieving their funding objectives. The study presents an overall success rate of 41% across all funding categories, highlighting a notable variance in funding amounts and success probabilities.

Additionally, the exploration through case studies of successful projects from Seedrs underscores the significance of transparent communication, strategic campaign planning, and robust community engagement in the success of crowdfunding endeavors. Startups that maintain effective communication channels with their backers and select platforms that resonate with their strategic goals tend to have a higher likelihood of success. The research also sheds light on the variety of crowdfunding models available, each tailored to meet specific project requirements, and underscores the transformative role of blockchain technology in bolstering transparency and enhancing security measures within the crowdfunding domain.

In conclusion, the thesis posits that while crowdfunding offers an efficient and accessible route for startups to secure funding, the success of such ventures is heavily contingent upon adept campaign management and a nuanced understanding of market dynamics.



## **Table of Contents**

<b>Abstract in Greek</b> .....	3
<b>Abstract</b> .....	5
<b>Table of Contents</b> .....	7
<b>Chapter 1 – Crowdfunding: definition, forms, and literature review</b> .....	11
<b>Start up financing</b> .....	11
<b>Crowdfunding</b> .....	14
<b>Main differences between traditional funding and crowdfunding</b> .....	17
<b>Transparency and crowdfunding</b> .....	19
<b>Security in Crowdfunding</b> .....	20
<b>Efficiency in Crowdfunding</b> .....	21
<b>Chapter 2 – European market overview, crowdfunding technology and case studies of successful campaigns</b> .....	24
<b>European crowdfunding platforms</b> .....	24
<b>Crowdfunding technology</b> .....	26
<b>Seedrs case studies</b> .....	30
<b>Chapter 3 –Empirical study</b> .....	35
<b>Methodology approach</b> .....	35
<b>Kickstarter statistics</b> .....	35
<b>Chapter 4 - Conclusions</b> .....	52
<b>General conclusions</b> .....	52
<b>Challenges and opportunities</b> .....	55
<b>Strategic recommendations for stakeholders</b> .....	56
<b>Future research directions</b> .....	57
<b>Annexes</b> .....	58
<b>Annex 1: Python code</b> .....	58
<b>References</b> .....	60





## **List of tables**

Table 1 - Crowdfunding platforms in Europe, page 25

Table 2 – Project statistics by category, page 36

Table 3 – Statistic findings page, page 38

Table 4 - Successfully funded projects, page 39

Table 5 – Unsuccessfully Funded Projects, page 41

## **List of figures**

Figure 1 – Approval and success rates of crowdfunding campaigns, page 26

Figure 2 – Illustration of statistic findings, page 38

Figure 3 – Illustration of successfully funded projects per category, page 40

Figure 4 – Illustration of unsuccessful funded projects, page 42

Figure 5 – Python outputs - descriptive analysis, page 44

Figure 6–Correlation matrix heatmap, page 46

Figure 7 – Volumes bar chart, page 47

Figure 8 - Success rate distribution, page 40

Figure 9 – Total dollars distribution, page 48

Figure 10 - Box plots, page 49

# **Chapter 1 – Crowdfunding: definition, forms, and literature review**

## **Start up financing**

The term “startup” is used to describe newly established companies typically characterized by their innovative approach, agility, and potential for rapid growth. These companies are often founded by entrepreneurs who aim to develop and bring to market a unique product or service (Graham, 2017). Startups are usually in their early stages of development, working to validate their business model, acquire customers, and secure funding to scale their operations (Mansoori, Karlsson, & Lundqvist, 2019). The term "startup" is commonly associated with ventures operating in dynamic and rapidly evolving industries such as technology, biotech, or e-commerce (Brown, Mawson, & Mason, 2017).

In 2023, global startup ecosystems were valued at over \$3 trillion, a figure that exceeds the GDP of many major economies (Startup Genome, 2023). In the United States alone, there were over 33.2 million small businesses, with startups representing a significant portion of this figure (U.S. Chamber of Commerce, 2023). Financing constitutes a critical component in the progression of nascent enterprises (startups). Its significance lies in its capacity to provide the financial resources necessary for startups to navigate the early stages of growth and establish a foothold in their respective industries (Block, Colombo, Cumming, & Vismara, 2018). However, the procurement of sufficient funding presents a formidable challenge for many startups. In 2022, only about 2% of startups successfully secured venture capital funding (CB Insights, 2023). Traditional external sources of funding for startups, such as angel investors and venture capitals are commonly sought after, yet they are often characterized by stringent eligibility criteria and intense competition (Drover et al., 2017).

Angel investors typically refer to high-net-worth individuals investing their personal funds into startups in exchange for equity ownership. Angel investors contributed approximately \$25 billion in funding to startups in the U.S. in 2022, spread across nearly 70,000 deals (Center for Venture Research, 2023). While angel investors may offer valuable mentorship and industry connections, their investments are often subject to stringent criteria (Avdeitchikova, Landström, & Månsson, 2020). Angels typically seek startups with strong growth potential, a compelling business model, and a capable management team (Politis, Gabrielsson, & Shveykina, 2019). This selectivity can make

it difficult for startups to secure funding, especially those in early stages or operating in niche markets. Similarly, venture capital firms pool funds from institutional investors to invest in startups with high growth potential (Kerr, Nanda, & Rhodes-Kropf, 2014). Venture capital investment reached \$445 billion globally in 2022, marking a significant decrease from the peak of \$681 billion in 2021, reflecting a more cautious investment environment (Crunchbase, 2023). Venture capitalists (VCs) seek startups that demonstrate scalability, market traction, and the potential for significant returns on investment (Cumming, Fleming, Johan, & Takeuchi, 2022). Competition for venture capital funding is fierce, with VCs receiving countless pitches from startups vying for their attention (Brown, Mawson, & Rowe, 2019). Consequently, startups must possess a compelling value proposition and a clear path to profitability to stand out in the crowded investment landscape.

Furthermore, both angel investors and venture capitalists typically involve extensive due diligence processes, including thorough assessments of the startup's business model, market opportunity, competitive landscape, and management team (Bertoni, Colombo, & Quas, 2019). This rigorous evaluation can prolong the fundraising process and may result in rejections for startups that do not meet the investors' criteria (Wright, Hart, & Fu, 2015). Additionally, negotiating deal terms and agreeing on equity valuations can be complex and time-consuming, further adding to the challenges associated with traditional fundraising methods (Bernstein, Giroud, & Townsend, 2016).

Another traditional debt financing option is bank loans. Despite being a more conventional method, startups face considerable hurdles when attempting to secure funds from banks. The stringent credit assessments and collateral requirements imposed by banks can be prohibitive for startups that lack a solid financial history or substantial assets. Moreover, the fixed repayment terms can strain a startup's cash flow, which is often unpredictable and fluctuating in the early stages (Brown & Earle, 2017).

Notably, government grants and subsidies represent another source of funding that can provide a substantial financial foundation for startups, particularly those involved in sectors like technology, clean energy, and healthcare. These funds are attractive because they do not require equity dilution or repayment, allowing startups to invest in growth and innovation. However, the application process can be complex and time-consuming, with no guarantee of success due to the competitive nature of these grants.

After receiving funding, startups must also adhere to specific use-of-funds requirements, which can limit their operational agility (Howell, 2021).

Additionally, in the early stages of development, startups often turn to incubators and accelerators for support. These specialized programs provide a nurturing environment that combines funding, mentorship, and business support services to help startups overcome initial challenges and achieve rapid growth. Accelerators typically offer a condensed, high-intensity experience that culminates in a pitch event or demo day, aiming to connect startups with potential investors and industry experts. Incubators, on the other hand, tend to provide a more extended period of support, focusing on the gradual development of the business and its foundational aspects. While the equity required by these programs can vary, startups must carefully weigh the benefits of immediate support against the potential dilution of their long-term ownership (Hallen, Bingham, & Cohen, 2020).

Bootstrapping, as an alternative to external funding, is a self-financing strategy where entrepreneurs utilize personal savings, reinvest profits, and maintain stringent cost management to grow their businesses. This approach enables founders to retain full control over their ventures, avoiding equity dilution typically associated with external investments. Bootstrapping encourages resourcefulness, financial discipline, and creative problem-solving, given the constraints of limited capital. However, a key trade-off is slower growth due to restricted financial resources. Entrepreneurs often face significant personal financial risk, as they may rely on savings or take on personal debt to fund their operations (Worrell & Mullins, 2018, Bhide, 2018).

In many cases, the initial funding for startups comes from friends and family. This form of financing is rooted in personal relationships, offering a level of flexibility and informality that is typically absent in more traditional funding avenues. Friends and family can provide quick access to capital with minimal procedural complexities, allowing entrepreneurs to overcome barriers associated with formal investment channels. However, the capital raised from friends and family is usually limited and may be insufficient for startups with larger financial needs. Moreover, intertwining personal relationships with business interests can create intricate emotional dynamics, particularly if the startup faces financial challenges. To mitigate these risks, it is crucial for entrepreneurs to establish clear communication and formalize agreements to manage expectations and safeguard personal relationships. This approach ensures that

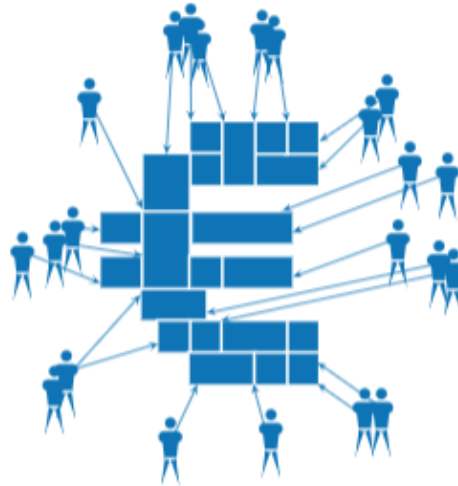
both the financial and relational aspects of the investment are respected and maintained (Harrison, Mason, 2018)

Taking into account the above stated, startups are increasingly turning to alternative financing avenues, with crowdfunding emerging as a prominent solution. In 2022, global crowdfunding platforms raised over \$34 billion, with a significant portion directed toward startup projects (Statista, 2023). By leveraging digital platforms to solicit funds from a diverse pool of individual backers, startups can circumvent the barriers associated with traditional funding sources and access the capital needed to fuel their endeavors (Vismara, 2019).

### **Crowdfunding**

Crowdfunding is a novel method for funding a variety of new ventures, allowing individual founders of for-profit, cultural, or social projects to request funding from many individuals, often in return for future products or equity. Crowdfunding projects can range greatly in both goal and magnitude, from small artistic projects to entrepreneurs seeking hundreds of thousands of dollars in seed capital as an alternative to traditional venture capital investment (Schwienbacher and Larralde, 2012). In other words, crowdfunding is a method of raising capital for a business venture, project, or cause by collecting small contributions from a large number of individuals, typically through online platforms or websites.

# CROWDFUNDING



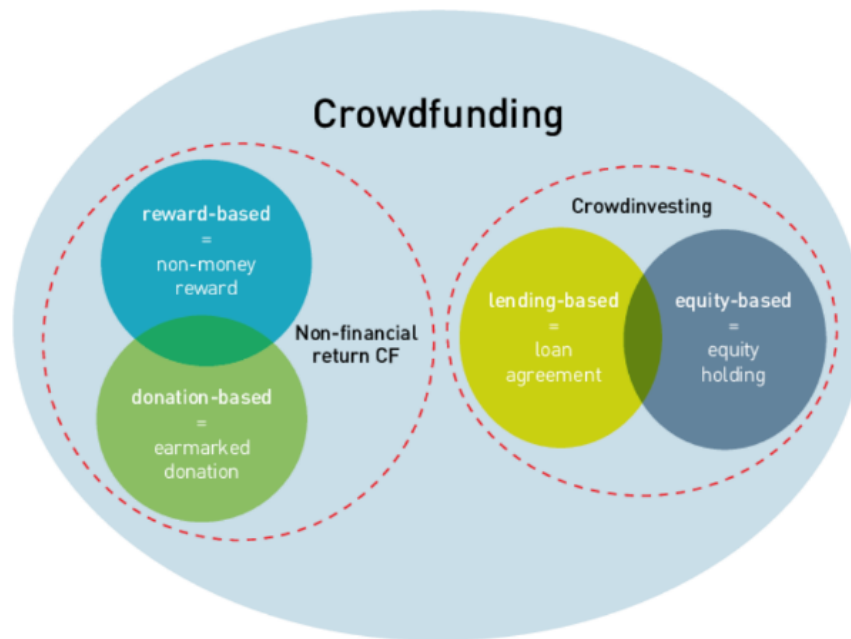
Many small sums from  
a large group of individuals

Image source: European Commission: Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, *Crowdfunding explained – A guide for small and medium enterprises on crowdfunding and how to use it*, Publications Office, 2015, <https://data.europa.eu/doi/10.2873/313319>

There are four primary crowdfunding models: donation-based, reward-based, equity-based, and debt-based crowdfunding.

1. **Donation-Based Crowdfunding:** Funders donate money without expecting any return. Mollick (2014) highlighted its use in social and artistic projects.
2. **Reward-Based Crowdfunding:** Contributors receive a reward or product in return for their investment. Mollick (2014) noted that this model is popular among startups for pre-selling products.
3. **Equity-Based Crowdfunding:** Investors receive shares in the company. Ahlers et al. (2015) discussed how this model provides startups with access to equity financing.
4. **Debt-Based Crowdfunding:** Funders receive interest payments in return for their loans. Herzenstein et al. (2011) examined the peer-to-peer lending model, a subset of debt crowdfunding, focusing on borrower-lender dynamics.





Source: [research gate](#)

According to Ethan Mollick's 2014 study, "The Dynamics of Crowdfunding: An Exploratory Study," the typical process of raising funds through crowdfunding includes several essential stages:

1. **Project Formulation:** This initial phase involves developing and defining the project or idea that will be showcased on a crowdfunding platform. Key activities include crafting a detailed project description, creating promotional materials like videos or prototypes, and setting clear goals.
2. **Campaign Launch:** The project is formally introduced on a crowdfunding site during this stage. The setup includes creating a campaign page, establishing funding targets, outlining reward structures (if applicable), and determining the campaign's duration.
3. **Promotion and Outreach:** Effective marketing strategies are employed to attract potential backers. This often involves utilizing social media, email campaigns, press coverage, and other promotional tactics to generate interest and drive contributions.
4. **Fundraising Period:** During the campaign, backers make contributions in exchange for rewards or other incentives. Tracking the progress of fundraising efforts is crucial to ensure that the project is on track to meet its financial goals.

5. **Campaign Management:** Ongoing engagement with backers is necessary to maintain interest and trust. This includes providing regular updates, responding to inquiries, and addressing feedback to foster a positive relationship with supporters.
6. **Financial Transactions:** Upon reaching or exceeding the funding goal, the platform processes the collected funds and transfers them to the project creator. This step involves managing the financial aspects of the campaign and ensuring accurate distribution of contributions.
7. **Fulfillment of Rewards:** After receiving the funds, the creator must deliver on the promises made during the campaign, including the provision of rewards and the completion of the project. This stage involves handling production and logistics while maintaining communication with backers.
8. **Post-Campaign Follow-Up:** After the project is completed, the creator should continue to engage with backers, provide updates on the project's outcome, and address any remaining issues. This phase may also involve collecting feedback and maintaining positive relations with supporters.

### **Main differences between traditional funding and crowdfunding**

While both traditional funding and crowdfunding serve as essential means of capital acquisition for startups, they differ significantly in their processes, transparency, and accessibility. Traditional funding methods, such as bank loans or venture capital, typically involve rigorous due diligence, creditworthiness assessments, and extensive documentation. These processes are time-consuming and often inaccessible to early-stage startups with limited financial history or collateral. Crowdfunding, on the other hand, bypasses many of these formalities, leveraging online platforms to attract small investments from a large number of backers (Cumming & Johan, 2020).

A key difference lies in the level of transparency and engagement. Traditional funding is usually conducted behind closed doors, where entrepreneurs present detailed financial plans to a select group of investors or banks. Crowdfunding, however, is conducted in a public online space, where project details are openly shared with potential backers, fostering direct engagement and allowing startups to showcase their

ideas to a wider audience. This transparency not only helps startups raise funds but also builds a community of early supporters who contribute to market validation and product feedback (Mollick, 2014).

In terms of efficiency, crowdfunding offers a faster and more streamlined process compared to traditional funding. Startups can launch campaigns quickly without waiting for lengthy approval processes. Additionally, the flexibility of various crowdfunding models—whether donation, reward, or equity-based—enables entrepreneurs to choose the most appropriate method for their specific needs. Reward-based models, for instance, allow startups to pre-sell products, raising capital without giving up equity or taking on debt, which is not an option in traditional funding structures (Belleflamme, Lambert & Schwienbacher, 2014).

From a security perspective, traditional funding is typically more regulated, with banks and venture capitalists closely scrutinizing the risks before committing funds. In contrast, crowdfunding, particularly in its early stages, was less regulated, although equity-based crowdfunding has recently seen tighter regulation to protect investors. This evolving regulatory landscape makes crowdfunding an increasingly secure option, especially for early-stage ventures looking to tap into alternative funding sources without the rigid control often imposed by traditional financiers (Ahlers et al., 2015).

## **Transparency and crowdfunding**

Transparency is crucial for building trust between fundraisers and backers. Studies have shown that transparency reduces information asymmetry and increases investor confidence. Ahlers et al. (2015) found that transparency in disclosing risks, business plans, and financial statements positively influences funding success. Similarly, Courtney et al. (2017) emphasized the role of transparent communication in mitigating backer concerns and enhancing project credibility. Moreover, transparency in crowdfunding extends beyond financial disclosures to encompass broader aspects of project communication and management. Ahlers et al. (2015) highlight the significance of clear and consistent communication throughout the crowdfunding campaign, from initial pitch to post-funding updates. They argue that regular updates on project progress, challenges faced, and milestones achieved foster a sense of accountability and engagement among backers, thereby sustaining their support beyond the funding phase. This aligns with the findings of Mollick (2014), who observed that successful crowdfunding campaigns often employ storytelling techniques to create emotional connections with backers and convey the project's vision effectively.

Furthermore, transparency in crowdfunding serves as a mechanism for addressing the inherent risks and uncertainties associated with early-stage ventures. By providing detailed information on project objectives, market analysis, and execution strategy, fundraisers can mitigate perceived risks and build credibility with potential backers (Courtney et al., 2017). This sentiment is echoed by Cumming et al. (2019), who suggest that transparent disclosure of project risks and mitigation strategies reduces investor uncertainty and increases their willingness to participate in crowdfunding campaigns. However, achieving optimal transparency in crowdfunding presents challenges, particularly regarding the balance between disclosing sufficient information to build trust while safeguarding proprietary business insights (Vismara, 2016).

In addition to its benefits for fundraisers and backers, transparency in crowdfunding contributes to the overall integrity and sustainability of the crowdfunding ecosystem. By promoting open and accountable practices, transparent crowdfunding platforms can enhance their reputation and attract a broader pool of high-quality projects and investors

(Agrawal et al., 2013). This resonates with the observations of Belleflamme et al. (2014), who argue that transparent platforms are better equipped to detect and deter fraudulent or low-quality projects, thereby safeguarding the interests of all stakeholders involved.

In a nutshell, the literature underscores the critical role of transparency in crowdfunding, emphasizing its positive impact on funding success, backer confidence, and platform integrity. However, achieving effective transparency requires careful consideration of communication strategies, risk disclosure practices, and platform governance mechanisms to balance the interests of fundraisers, backers, and platform operators.

### **Security in Crowdfunding**

Security is a significant concern in crowdfunding, as the online nature of transactions makes them vulnerable to fraud and cyberattacks. Cumming et al. (2019) highlighted the need for robust regulatory frameworks to protect investors. They argued that platforms with stringent security measures attract more backers and maintain higher funding success rates. Agrawal et al. (2013) underscored the importance of secure payment systems and rigorous verification processes. The potential for fraud in crowdfunding can undermine investor confidence. In response, many platforms have implemented measures such as identity verification, escrow accounts, and third-party audits. Cumming et al. (2019) noted that platforms with higher security protocols report lower instances of fraud and higher levels of investor trust. Furthermore, the emergence of blockchain technology has introduced new avenues for enhancing security in crowdfunding. Blockchain-based crowdfunding platforms offer immutable transaction records and smart contract functionalities, reducing the risk of fraudulent activities and enhancing transparency (Belleflamme et al., 2018). These platforms leverage decentralized consensus mechanisms to validate transactions, thereby mitigating the reliance on centralized intermediaries and reducing the potential for manipulation or data breaches (Yermack, 2017).

In addition to technological solutions, regulatory interventions play a crucial role in safeguarding the security of crowdfunding transactions. Several jurisdictions have introduced specific regulations governing crowdfunding activities, aiming to protect investors from fraudulent schemes while fostering innovation and capital formation (Zhang et al., 2020). These regulations typically impose requirements on platform operators regarding due diligence, disclosure, and investor accreditation, thereby enhancing investor protection and market integrity (Bruton et al., 2021).

Despite these advancements, challenges persist in ensuring the security of crowdfunding ecosystems. The dynamic nature of cyber threats requires continuous adaptation of security measures to counter evolving risks (Kock et al., 2021). Moreover, the global nature of crowdfunding platforms necessitates harmonized regulatory frameworks to address cross-border challenges and ensure consistent investor protection standards (Schwienbacher & Larralde, 2012).

In summary, the multifaceted nature of security in crowdfunding, encompassing technological, regulatory, and operational dimensions. While advancements in security protocols and regulatory frameworks have bolstered investor confidence and platform resilience, ongoing vigilance and collaboration among stakeholders are essential to address emerging threats and sustain the integrity of crowdfunding ecosystems.

### **Efficiency in Crowdfunding**

Efficiency in crowdfunding refers to the smoothness and speed of the funding process and the ease with which backers and entrepreneurs can interact on the platform. Efficient processes reduce transaction costs, streamline communication, and enhance user experience. Mollick (2014) and Belleflamme et al. (2014) note that platform design and user interface significantly impact campaign efficiency. Efficient platforms facilitate quick project launches, seamless transaction processing, and effective communication between backers and creators.

Koch et al. (2019) find that campaigns that efficiently manage their operations—such as timely updates and transparent milestone tracking—are more likely to achieve their funding goals. The integration of project management tools and analytics can further

enhance campaign efficiency, providing creators with real-time feedback and backers with up-to-date information on campaign progress.

Moreover, efficiency in crowdfunding extends beyond the funding process to encompass post-campaign activities and project outcomes. Scholars have emphasized the importance of efficient resource allocation and project execution in maximizing the value generated from crowdfunding campaigns (Agrawal et al., 2013). Efficient utilization of funds and timely delivery of rewards or products contribute to positive backer experiences and foster repeat participation in future campaigns (Burtch et al., 2013).

Furthermore, the efficiency of crowdfunding platforms can have broader implications for entrepreneurial ecosystems and innovation dynamics. Agrawal et al. (2014) argue that efficient crowdfunding markets allocate capital to high-potential projects more effectively than traditional funding channels, reducing financing frictions for innovative ventures. This democratization of capital allocation promotes diversity and inclusivity in entrepreneurship, enabling a wider range of founders to access funding and pursue their ventures (Ordanini et al., 2011).

However, achieving efficiency in crowdfunding poses significant challenges related to platform scalability, governance, and regulatory compliance. As platforms grow and attract a larger user base, maintaining efficient operations becomes increasingly complex. This growth often results in increased infrastructure demands and the need for improved investor management systems, which can complicate platform scalability (Belleflamme, Lambert, & Schwienbacher, 2014). Additionally, governance structures need to evolve to prevent fraud and ensure transparency, which becomes more challenging as platforms expand (Lehner, 2013). Furthermore, regulatory constraints, particularly when operating across multiple regions, impose compliance burdens that limit the flexibility of crowdfunding platforms and negatively impact their operational efficiency (Ziegler, Shneor, & Wenzlaff, 2020).

It is evidenced by the literature that the multifaceted nature of security in crowdfunding, encompassing technological, regulatory, and operational dimensions. While advancements in security protocols and regulatory frameworks have bolstered investor

confidence and platform resilience, ongoing vigilance and collaboration among stakeholders are essential to address emerging threats and sustain the integrity of crowdfunding ecosystems.



## **Chapter 2 – European market overview, crowdfunding technology and case studies of successful campaigns**

### **European crowdfunding platforms**

According to a survey performed by the Crowdfunding research center of Norway, as of March 2023, Europe had 594 active crowdfunding platforms. Given that some platforms operate across multiple countries, there were a total of 785 platform-country pairs.

The table below, provides data on the number of crowdfunding platforms operating in each country (regardless of where they are headquartered) and rank the countries based on the number of platforms per capita.

Table 1 - Crowdfunding platforms in Europe

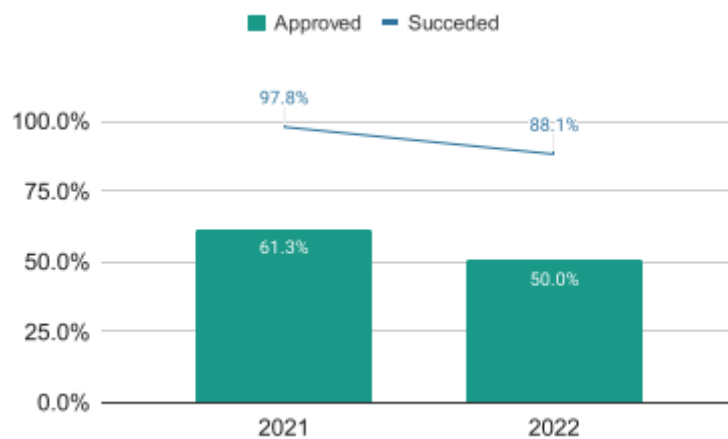
Country	Number of platforms operating in country	Rank based on number of platforms per capita
Monaco	4	1
Estonia	32	2
Malta	5	3
Latvia	18	4
Iceland	3	5
Lithuania	17	6
Switzerland	49	7
Luxembourg	3	8
Croatia	16	9
Cyprus	5	10
Netherlands	60	11
Montenegro	2	12
Norway	15	13
Austria	24	14
Denmark	13	15
Ireland	10	16
Czechia	17	17
Belgium	18	18
United Kingdom	100	19
Slovakia	8	20

Country	Number of platforms operating in country	Rank based on number of platforms per capita
Finland	8	21
France	96	22
Germany	113	23
Sweden	14	24
North Macedonia	2	25
Spain	46	26
Slovenia	2	27
Bulgaria	6	28
Portugal	8	29
Albania	2	30
Bosnia Herzegovina	2	31
Italy	33	32
Greece	5	33
Serbia	3	34
Hungary	3	35
Poland	10	36
Ukraine	9	37
Romania	4	38
Moldova	0	39

Platforms act as crucial mediators of trust and quality assurance between supporters and those raising funds. As part of their role, they selectively approve campaigns for publication after conducting necessary compliance and quality assessments.

As shown in the figure below, in 2021, platforms gave the green light to roughly 61.3% of campaigns submitted by fundraisers, whereas in 2022, the approval rate dropped to 50%. This high rejection rate of at least 50% by platforms is a strong indicator of their dedication to curating high-quality cases. Although the success rates for campaigns were high in both years, 2021 saw an exceptionally high success rate of nearly 98% as reported by platforms. However, in 2022, there was a decline of 10%, bringing the success rate down to 88%. This decrease may be attributed to the increased market volatility in 2022, which could affect both the caliber of fundraisers attempting to initiate campaigns and the willingness of backers to support them.

Figure 1 – Approval and success rates of crowdfunding campaigns



### **Crowdfunding technology**

Technology is the cornerstone of the crowdfunding industry, revolutionizing the fundraising process by providing global access to investment opportunities, a seamless user experience, secure payments, regulatory compliance, data analytics, marketing communication, scalability, and performance optimization. This chapter explores the technological evolution within European crowdfunding platforms, highlighting the adoption of various strategies such as advanced payment processing, the incorporation of cutting-edge features, leveraging blockchain technology, and streamlining operations through automation. These technological advancements are pivotal in

understanding how platforms are innovating to maintain a competitive edge and adapt to the dynamic needs of their users, ensuring the sector's growth and sustainability.

As far as the payment process/ transferring funds it is a critical operation, managed either by specialized third-party providers or by the crowdfunding platforms themselves through their own payment systems. When a platform opts for a third-party service, these providers take charge of the complex tasks involved in payment processing. They handle the necessary identity checks for Know Your Customer (KYC) and Anti-Money Laundering (AML) regulations, set up digital wallets for users, and manage the logistics of payments and refunds. They also ensure that the funds are held securely, often in escrow, until they can be released to the fundraiser.

On the other hand, some crowdfunding platforms choose to develop their own payment gateways. This approach requires them to obtain the appropriate payment service provider license and take on the responsibility of managing all aspects of the payment process. While this can be more challenging, especially for newer platforms with limited resources, it gives them direct control over the payment experience.

In both cases, the goal is to provide a smooth, secure, and efficient payment process that instills trust in users and supports the successful completion of crowdfunding campaigns.

**Key trends in payment processing include:**

**Multi-Currency Support:** Given the cross-border nature of many crowdfunding campaigns, the ability to handle multiple currencies seamlessly is essential. Platforms have integrated multi-currency payment gateways to facilitate international transactions and broaden their user base.

**Instant Payment Solutions:** To enhance user experience, platforms are increasingly adopting instant payment solutions. These solutions expedite the funding process and build trust among backers by providing immediate transaction confirmations.

**Enhanced Security Measures:** Advanced encryption technologies and robust fraud detection systems are standard features, ensuring the security of transactions and safeguarding user data against breaches.

Crowdfunding platforms often go beyond the basics of showcasing investment opportunities, registering investors, facilitating investments, and distributing returns.

They introduce a suite of advanced features designed to enhance the user experience for both investors and fundraisers, as well as to push the boundaries of crowdfunding technology.

The decision to implement these additional features is not uniform across all platforms. It varies depending on the platform's business model, the resources available for development, and the commitment to maintaining new functionalities. Some of the innovative features that platforms consider include automated investing tools that allow users to invest without manual intervention, secondary markets for trading investments, referral programs to incentivize user growth, mobile applications for on-the-go access, integration with open banking for seamless financial data connectivity, advisory services for guided investing, early access to investment opportunities for a select group of investors, and legal tech to streamline compliance and legal processes.

Blockchain technology, while not yet a mainstay in the crowdfunding landscape, holds the potential to revolutionize the industry with its array of benefits. This cutting-edge technology offers enhanced data security and traceability, ensuring that sensitive information is protected and transactions are meticulously recorded. Its inherent transparency allows all participants to see the flow of funds and the progress of campaigns, fostering trust within the community. Smart contracts, one of blockchain's hallmark features, automate and secure transactions, eliminating the need for intermediaries and reducing the risk of fraud. These self-executing contracts with the terms of the agreement directly written into code are a game-changer for transaction security and efficiency.

Beyond these foundational advantages, blockchain technology presents concrete applications such as cryptocurrency payments, which introduce a new level of accessibility and convenience for international backers. Secondary trading on blockchain platforms can provide liquidity for investors, allowing them to buy and sell their stakes with ease. Asset tokenization is particularly transformative, especially in sectors like real estate crowdfunding. It involves dividing a tangible asset into digital tokens, each representing a share of the property, making investment opportunities more accessible and divisible among a broader range of investors.

By integrating blockchain solutions such as asset tokenization, crypto payments, and secondary trading, crowdfunding platforms can unlock new possibilities for growth and innovation. They can cater to a tech-savvy audience, streamline operations, and break down barriers to investment, making the process more inclusive and dynamic. As blockchain technology continues to mature, we can expect to see its adoption in crowdfunding increase, offering a more secure, transparent, and efficient way to connect fundraisers with a global pool of investors.

It is worth mentioning that crowdfunding platforms are incorporating a variety of advanced features (including blockchain features) designed to improve user engagement and campaign success rates. Notable features include:

**Artificial Intelligence and Machine Learning:** These technologies are leveraged for predictive analytics, personalizing user experiences, and optimizing campaign outcomes. AI-driven insights allow platforms to understand user behavior better and tailor their services to meet individual needs.

**Gamification:** By integrating gamification elements, such as achievement badges, leaderboards, and interactive updates, platforms enhance user engagement and participation, making the crowdfunding experience more dynamic and enjoyable.

**Social Media Integration:** Seamless integration with social media platforms enables campaigners to reach a wider audience. Social sharing tools and analytics help track campaign performance and engagement metrics, facilitating more effective promotional strategies.

Technological advancements are playing a pivotal role in shaping the future of the crowdfunding industry in Europe. By adopting innovative payment processing solutions, advanced features, blockchain technology, and process automation, crowdfunding platforms are enhancing their operational efficiency and user experience. These technological strategies not only help platforms stay competitive but also contribute to the broader democratization of finance, making crowdfunding an increasingly viable alternative for funding diverse projects. As the industry continues to evolve, the integration of new technologies will be essential for maintaining growth and addressing the dynamic needs of fundraisers and backers alike.

## **Seedrs case studies**

Seedrs, founded in 2009, is a UK-based equity crowdfunding platform that allows individuals to invest in private companies. It enables startups and growing businesses to raise capital by offering equity to a wide range of investors. The platform facilitates the entire investment process online, from due diligence and investment documentation to post-investment management and shareholder communications.

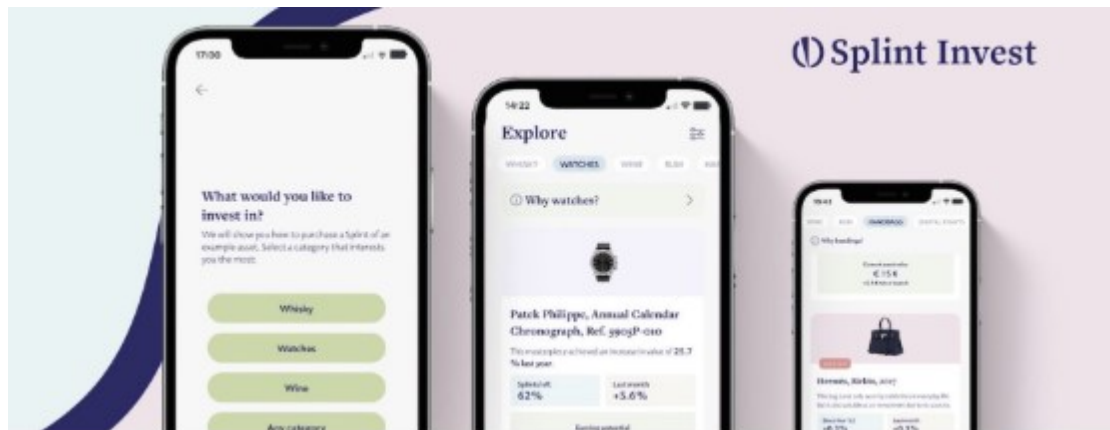
A cornerstone of Seedrs' operational framework is its rigorous due diligence process. Prior to listing on the platform, companies undergo comprehensive scrutiny to assess their viability and growth potential. This diligence not only mitigates investment risks but also provides investors with detailed insights and metrics essential for informed decision-making. Such measures enhance transparency and cultivate trust among stakeholders, crucial for fostering a sustainable investment ecosystem.

Seedrs adheres to robust regulatory frameworks aimed at protecting investor interests and complying with financial regulations. This commitment plays a pivotal role in boosting investor confidence and strengthening the platform's credibility but also solidifies its role as a reliable intermediary in the crowdfunding industry.

As part of this master's thesis, three case studies were selected for analysis. Each case consists of interviews with startup founders who sought financing through Seedrs g platform. These cases were chosen based on characteristics such as the type of project, the duration of the crowdfunding campaign, the amount of funding sought, and the level of community engagement.

### **Case Study: Splint Invest - Empowering European Private Investors**

The first case study features an interview with the founders of Splint Invest, a fintech company dedicated to democratizing investment opportunities. The case was selected due to Splint Invest's innovative approach to fractional asset ownership and their successful fundraising campaign on Seedrs, which raised €1.5 million.



According to Aurelio Perucca, one of the founders, Splint Invest chose Seedrs to raise capital because of its positive reputation and alignment with their collaborative values. They strategically engaged the community through crowdfunding to expand their investor base and involve stakeholders in key decisions. The success of their campaign was attributed to thorough preparation, leveraging their extensive network, and Seedrs' supportive environment for fundraising.

Perucca highlighted that raising over €1 million on Seedrs required meticulous planning and significant effort. Splint Invest capitalized on their community's support, actively engaging investors to strengthen relationships and explore potential business partnerships. Beyond securing essential funds, this approach facilitated valuable networking opportunities.

Based on their experience, Splint Invest recommends using crowdfunding platforms like Seedrs for their community-driven approach and networking benefits. They advise founders to initiate fundraising early, ensure comprehensive preparation, and navigate local regulations effectively.

This case study underscores the importance of strategic platform selection, community engagement, and thorough preparation in achieving crowdfunding success within the fintech sector.

### **Case Study: Zereau Drinks - Revolutionizing Urban Agriculture**

The following case study features an interview with Daf Dubbelman, Managing Partner at Zereau Drinks, a company dedicated to eliminating single-use bottled drinks through sustainable alternatives. Zereau Drinks successfully raised €408,250 from 203 investors on the Seedrs platform in October 2022, surpassing their initial fundraising target.





The decision to crowdfund on Seedrs was driven by Zereau Drinks' community-oriented approach and their aspirations for international expansion. They were drawn to Seedrs for its global reach and secondary market, which aligned with their goal of attracting environmentally conscious investors. Despite the challenges of the fundraising process, Zereau Drinks benefited from active community engagement and valuable investor feedback, which enhanced their business strategy and narrative.

Reflecting on their fundraising journey, Daf Dubbelman advises aspiring founders to prioritize professional marketing and storytelling. Improving campaign videos and pitch decks can significantly enhance interest and engagement, crucial for attracting investors who resonate with the company's sustainability mission.

Overall, the insights gained from Zereau Drinks' experience underscores the importance of strategic platform selection and effective communication in achieving fundraising success and fostering investor confidence.

### **Case Study: Square Mile Farms - Turning Grey Space into Green**

Square Mile Farms, founded by Patrick Dumas and Johnathan Ransom, is a trailblazing vertical farming enterprise dedicated to transforming urban areas into thriving agricultural centers while championing sustainability and community engagement. Their journey began on Seedrs in 2020, where they raised £503,496 from 891 investors. Returning to Seedrs in 2022, they successfully secured an additional £643,863 from 695 investors, expanding their investor base to a total of 1,470 individuals.



Patrick Dumas emphasizes that prior to engaging Seedrs, significant personal investments were made to establish the business independently. The initial Seedrs campaign proved instrumental in acquiring customers and expanding services. Subsequent funding rounds were pivotal for scaling operations, including recruiting staff, covering operational costs, and developing infrastructure crucial for enhancing production capabilities and market penetration.

Seedrs was chosen due to its alignment with Square Mile Farms' core values of community engagement and sustainability. The platform provided an ideal environment for connecting with a diverse investor base passionate about urban agriculture and environmental conservation. This strategic emphasis on community investment resulted in over 1,000 investors, many of whom participated in multiple funding rounds, underscoring sustained confidence and support for the company's mission.

Reflecting on their fundraising journey, Square Mile Farms identified streamlined communication strategies and proactive outreach as key factors contributing to their success. By their second campaign, they had refined their messaging and outreach tactics, significantly boosting investor engagement and organizational efficiency. Regular updates to investors not only kept the community well-informed but also facilitated valuable networking opportunities and business connections, highlighting the importance of transparent and consistent communication.

The funds raised have been instrumental in expanding Square Mile Farms' operations, securing partnerships with over 60 clients, including major corporations, and bolstering infrastructure to support ongoing growth.

In conclusion, Square Mile Farms exemplifies the power of strategic fundraising and community engagement in advancing sustainable business practices. Their partnership with Seedrs has not only provided essential financial support but also amplified their impact in fostering healthier, more environmentally conscious urban environments.

## **Chapter 3 –Empirical study**

### **Methodology approach**

The methodology of this thesis involves an exploration of crowdfunding platforms using a quantitative research approach to gather comprehensive insights. The initial phase involved conducting desktop research on various crowdfunding platforms to identify potential sources of data.

During the desktop research, it became evident that there is limited information available on crowdfunding campaigns. There are not many accessible databases, and there is no standardized procedure or clear steps for recording and analyzing campaign data. This lack of standardized information and resources presents a challenge in obtaining consistent and comprehensive data, highlighting the necessity of a rigorous quantitative approach to extract meaningful patterns.

Following the preliminary research, Kickstarter was chosen as the primary platform for analysis due to its accessible database. This data will be analyzed to identify patterns, trends, and metrics within the crowdfunding domain, providing quantitative insights into the dynamics of crowdfunding campaigns.

### **Kickstarter statistics**

Kickstarter is a crowdfunding platform that enables creators, artists, inventors, and entrepreneurs to raise funds for creative projects and innovative ideas. Launched in 2009, Kickstarter operates on an all-or-nothing funding model, where project creators set a funding goal and a deadline (<https://www.kickstarter.com/about?ref=global-footer>). Interested individuals, known as backers, pledge financial support to projects they find compelling. If the project meets or exceeds its funding goal by the deadline, the pledged funds are collected, and the project moves forward. However, if the funding goal is not met, no money changes hands.

Kickstarter campaigns cover a wide range of categories, including art, music, film, technology, games, design, and more. Backers typically receive rewards or incentives based on their level of contribution, such as early access to products, special editions, or acknowledgments in the project.

The data extracted from Kickstarter produced three tables regarding Projects and Dollars, Successfully Funded Projects, and Unsuccessfully Funded Projects, capturing all available data, since the launch of the platform, up to 23 November 2023.

The first table provides an overview of various project categories, including the number of launched projects, total dollars raised, amounts for successful and unsuccessful projects, live project dollars, number of live projects, and the success and failure rates for each category.

The second table details successfully funded projects, categorizing them by the amount of money raised, with specific ranges from less than \$1,000 to over \$1 million. It illustrates the distribution of projects across these funding brackets within each category.

The third table offers insights into unsuccessfully funded projects, broken down by the percentage of their funding goals achieved. It includes ranges from 0% funded to 81-99% funded, showing how close these projects came to reaching their goals before ultimately failing.

**Table 2 – Project statistics by category**

Category	Launched Projects	Total Dollars in millions	Successful Dollars in millions	Unsuccessful Dollars in millions	Live dollars in millions	Live projects	Success Rate	Failure rate
Art	51,679	\$206.63	\$188.65	\$17.43	\$0.55	207	49%	51%
Comics	26,456	\$234.84	\$223.20	\$9.32	\$2.32	278	66%	34%
Crafts	14,016	\$31.39	\$27.05	\$4.30	\$0.04	45	27%	73%
Dance	4,552	\$16.23	\$15.03	\$1.18	\$0.02	7	61%	39%
Design	54,049	\$1,650.00	\$1,530.00	\$108.78	\$8.25	317	42%	58%
Fashion	39,138	\$243.97	\$214.83	\$28.41	\$0.73	165	31%	69%
Film & Video	85,117	\$564.37	\$479.23	\$84.04	\$1.10	299	38%	62%
Food	34,757	\$206.27	\$176.81	\$29.21	\$0.25	119	26%	74%
Games	82,314	\$2,330.00	\$2,200.00	\$116.97	\$13.10	759	49%	51%
Journalism	6,358	\$21.15	\$18.45	\$2.65	\$0.04	14	23%	77%

Music	69,120	\$289.79	\$266.35	\$22.58	\$0.86	162	50%	50%
Photography	13,899	\$62.77	\$55.79	\$6.73	\$0.25	41	35%	65%
Publishing	63,713	\$340.59	\$310.97	\$26.91	\$2.71	314	38%	62%
Technology	53,116	\$1,470.00	\$1,310.00	\$133.97	\$18.65	290	23%	77%
Theater	13,153	\$50.56	\$45.47	\$5.08	\$0.02	24	60%	40%

The table provides an examination of crowdfunding projects performance across an array of categories, ranging from Games to Journalism, each embodying distinct challenges, and opportunities for project creators. From the dynamic landscape of gaming to the creative realms of art, technology, and beyond, comprehending the nuanced performance of projects across diverse categories is essential for stakeholders seeking to adeptly utilize crowdfunding as a mechanism for securing funding.

Delving more into the insights:

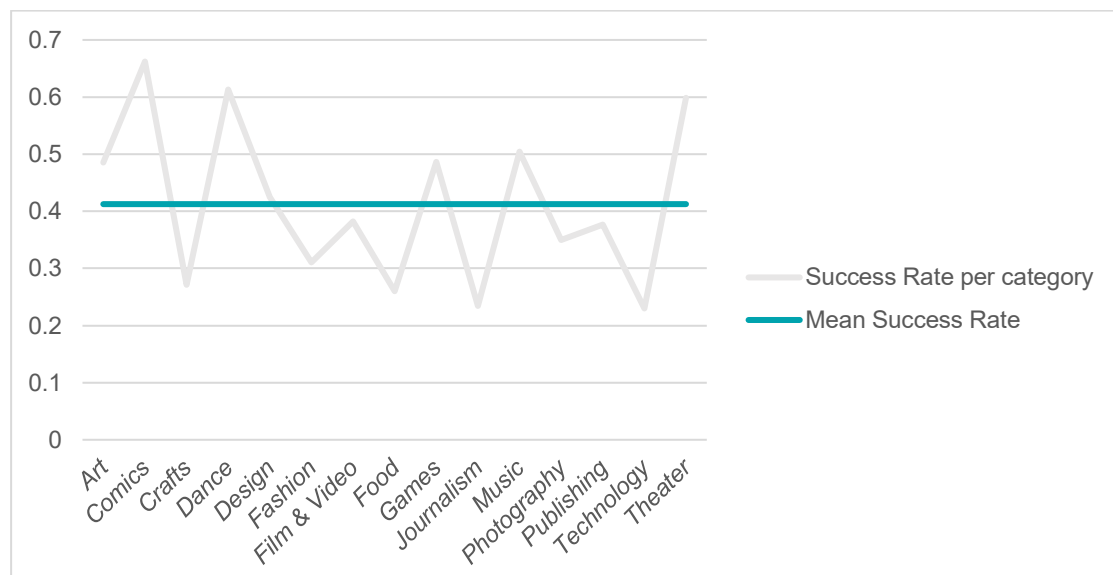
- Games emerge as the most prolific category, with 82,314 projects launched, accumulating a substantial total funding of \$2.33 billion. However, while successful projects account for \$2.20 billion, approximately \$116.97 million go to unsuccessful ventures.
- Design follows closely behind Games with 54,049 projects, garnering \$1.65 billion in total funding. Despite the impressive figures, the success rate in this category stands at 42.49%, indicating a significant portion of projects do not reach their funding goals.
- Publishing and Film & Video also attract considerable attention, with 63,713 and 85,117 projects respectively. However, both categories experience a relatively high failure rate, with 62.38% and 61.79% of projects respectively failing to secure funding.
- Art and Comics display promising success rates of 48.55% and 66.22% respectively. Despite their relatively lower total funding compared to other categories, they demonstrate a higher likelihood of project success.
- Technology projects face considerable challenges, with only a 22.99% success rate, indicating a higher likelihood of failure in this category.
- Fashion and Food categories also exhibit lower success rates, at 31.03% and 26.02% respectively, suggesting a tougher crowdfunding landscape for ventures in these industries.
- Crafts and Journalism categories show similar trends, with success rates of 27.10% and 23.41% respectively, underscoring the challenges faced by projects in these niche areas.
- Dance projects boast a relatively high success rate of 61.32%, indicating a potential niche market for crowdfunding within the performing arts sector

Table 3 – Statistic findings

Statistic measurement	Finding
Success rate	41%
Standard deviation	0.14
Range	23%-66%
Correlation coefficient between success rates and total dollars raised	-0.0439

Overall, the average success rate across all categories is 41% demonstrating a reasonable level of efficiency for crowdfunding as a funding method, while the standard deviation is 0.14 (14%). A standard deviation of 14% indicates that there is moderate variability in the likelihood of success across different categories of crowdfunding projects. The actual range spans from 23%, as the lower success rate in the Journalism category, to 66% Comics. This suggests that while some categories are more efficient in securing funding, others face greater challenges.

Figure 2 – Illustration of statistic findings



Additionally, the correlation coefficient between success rates and total dollars raised is of -0.0439, revealing a very weak negative correlation between the success rate and the total dollars raised across various crowdfunding categories. This weak negative

relationship implies that there is almost no linear relationship between the total amount of funding raised and the success rates of projects within those categories. Consequently, the efficiency of crowdfunding, in terms of converting total funding into successful projects, appears to be relatively unaffected by the total funding volume.

**Table 4 - Successfully funded projects**

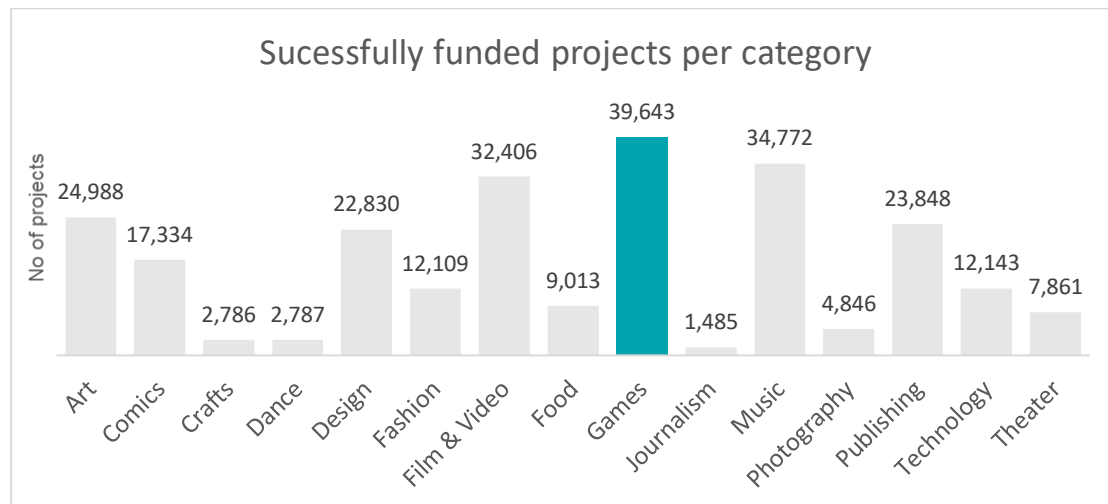
The table provides a breakdown of successfully funded projects across various categories. Each row represents a different category, such as Art, Comics, Crafts, Dance, Design, Fashion, Film & Video, Food, Games, Journalism, Music, Photography, Publishing, Technology, and Theater.

For each category, the table displays the total number of projects successfully funded, as well as the distribution of funding amounts.

Projects	Successfully funded projects	Less than \$ 1,000 raised	\$ 1,000 to \$9,999 raised	\$ 10,000 to \$19,999 raised	\$ 20,000 to \$99,999 raised	\$ 100K to \$999,999 raised	\$ 1m raised
Art	24,988	6,715	14,296	2,244	1,549	179	5
Comics	17,334	1,977	10,930	2,186	1,940	297	5
Crafts	2,786	1,273	1,978	287	225	21	2
Dance	2,787	251	2,165	281	88	2	0
Design	22,830	1,572	7,639	3,817	6,795	2,821	186
Fashion	12,109	2,165	5,712	1,923	1,945	358	6
Film & Video	32,406	3,874	18,131	5,024	4,835	530	12
Food	9,013	809	3,615	2,170	2,274	133	12
Games	39,643	3,958	16,857	6,471	8728	3,296	334
Journalism	1,485	274	773	201	215	22	0
Music	34,772	3,374	24061	4,939	2,278	118	2
Photography	4,846	890	2,542	764	596	54	0
Publishing	23,848	3,234	14,672	3,301	2,365	269	7
Technology	12,143	644	3,134	1,832	3,916	2,404	213
Theater	7,861	1,113	5,682	707	340	19	0
Total	248,851	32,123	132,187	36,147	38,089	10,523	784



Figure 3 – Illustration of successfully funded projects per category



The analysis of total successfully funded projects per category reveals that the "Games" category holds the highest number of successful projects, totaling 39,643. For this category there were substantial numbers across all funding ranges, particularly in the \$1,000 to \$9,999 and \$20,000 to \$99,999 ranges.

Following closely behind Games, the Music category showcased the second-highest number of successfully funded projects, amounting to 34,772. A significant proportion of these projects raised less than \$10,000.

The Technology category, while not leading in the overall number of projects, exhibited a noteworthy presence of high-value projects. Specifically, there were 213 projects that raised between \$100,000 to \$999,999, and 37 projects that raised over \$1 million.

In general, the table reveal disparities in the distribution of successfully funded projects across various categories. Categories such as Games, Music, and Film & Video emerge as the most prevalent, showcasing interest and support from the crowdfunding community. Conversely, niche categories like Journalism and Crafts exhibit comparatively lower levels of success, indicating potential challenges or limited demand within these segments.

Furthermore, the data underscores the dominance of arts and entertainment-related categories among successfully funded projects. Art, Comics, Design, Fashion, Film & Video, Music, Photography, and Theater collectively constitute a significant portion of the dataset, reflecting the platform's inclination towards creative endeavors.

Categories such as Technology and Publishing, while not as prolific as Games or Music, demonstrate a noteworthy presence in terms of successfully funded projects.

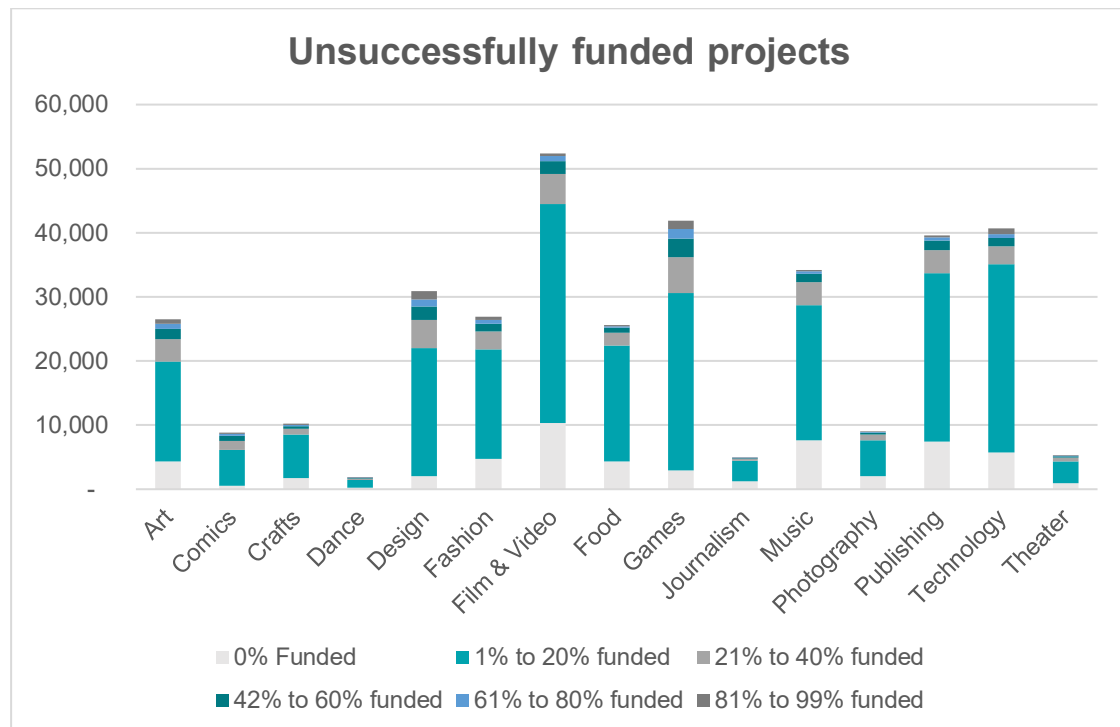
**Table 5 – Unsuccessfully Funded Projects**

<b>Projects</b>	<b>Unucessfully funded projects</b>	<b>0% Funded</b>	<b>1% to 20% funded</b>	<b>21% to 40% funded</b>	<b>42% to 60% funded</b>	<b>61% to 80% funded</b>	<b>81% to 99% funded</b>
Art	26,484	4,291	15,646	3,443	1,627	765	712
Comics	8,844	551	5,536	1,417	785	363	192
Crafts	10,185	1,754	6,767	911	404	179	170
Dance	1,758	289	1,167	187	80	24	11
Design	30,902	2,025	19,973	4,417	2,137	1,047	1,301
Fashion	26,909	4,746	17,110	2,756	1,239	547	511
Film & Video	52,412	10,297	34,153	4,772	1,971	818	401
Food	25,625	4,366	18,069	1,992	771	248	179
Games	41,913	2,977	27,662	5,562	2,913	1,504	1,295
Journalism	4,859	1,267	3,202	268	76	23	23
Music	34,186	7,647	21,054	3,584	1,278	391	232
Photography	9,012	2,031	5,556	917	317	142	49
Publishing	39,551	7,418	26,231	3,664	1,485	510	243
Technology	40,684	5,720	29,370	2,803	1,274	589	928
Theater	5,269	917	3,402	624	210	74	42
<b>Total</b>	<b>358,593</b>	<b>56,296</b>	<b>34,898</b>	<b>37,317</b>	<b>16,567</b>	<b>7,224</b>	<b>6,289</b>

The table presents unsuccessfully funded projects across diverse crowdfunding categories offering a quantitative look into the challenges encountered by entrepreneurial ventures seeking funding. It reveals that out of a total of 358,593 projects analyzed, a substantial 56,296 projects failed to secure any funding, representing approximately 15.7% of all projects examined. Moreover, when considering the breakdown by funding ranges, a significant number of projects—34,898 (9.7%) falling in the 1% to 20% funded range and 37,317 (10.4%) in the 21% to 40% funded range—illustrate the difficulty many projects face in gaining early traction and reaching critical funding thresholds.

The data also highlights sector-specific disparities in project success rates. For instance, categories such as Film & Video and Technology exhibit particularly high numbers of unsuccessfully funded projects, with 52,412 and 40,684 projects respectively. Conversely, while sectors like Dance and Theater show lower overall project counts, they still experience notable challenges, with significant percentages of their projects landing in the lower funding ranges.

Figure 4 – Illustration of unsuccessfully funded projects



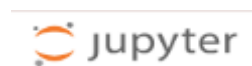
### Data analysis using Python

To enhance the analysis of the Kickstarter dataset, the Anaconda distribution of Python was used, specifically leveraging the Jupyter Notebook environment. The purpose of using Python in this thesis is to analyze crowdfunding data and identify trends that influence campaign success. By utilizing Python’s advanced data manipulation and visualization libraries, the analysis aims to quantify relationships between variables such as project category, funding amount, and success rates. Python was chosen for its flexibility and power in managing large datasets, automating repetitive tasks, and generating sophisticated visual representations. This analysis seeks to clarify how key metrics like total funds raised, success rates across categories, and project viability can be analyzed both visually and statistically, providing a clearer understanding of crowdfunding dynamics and offering strategic insights for entrepreneurs and investors.

The Anaconda distribution provides a convenient package management system and a collection of pre-installed libraries tailored for data science, which streamlines setup and integrates the workflow. In Jupyter Notebook, the Pandas library was used for efficient data manipulation, allowing for systematic cleaning, structuring, and

processing of the dataset. This enables handling various attributes, such as project category, funding amount, and success rate, in a scalable way.

Additionally, the Seaborn library was employed for data visualization, enabling detailed graphical representations such as bar charts, heatmaps, and box plots. These visualizations highlight patterns and correlations between different variables in the dataset, such as the relationship between project categories and their funding success.



Before beginning the analysis, the data were encapsulated within a Python dictionary object named 'data', where each key corresponds to a specific attribute of the Kickstarter projects, such as 'Category', 'Launched\_Projects', 'Total\_Dollars', and so forth. The keys are associated with lists of values, each list containing the respective attribute's data for all categories considered.

To facilitate the data analysis process, the hard values contained within the dictionary were then transferred into a Pandas DataFrame. The DataFrame, assigned to the variable 'df', is a powerful data structure provided by the Pandas library that allows for efficient manipulation and analysis of tabular data.

The transition of the hard values into a DataFrame enables the application of various analytical techniques and methods. For instance, the 'describe()' method was employed on the DataFrame to perform descriptive statistics, yielding a statistical summary. This summary, stored in the variable 'descriptive\_stats', includes key metrics such as the count, mean, standard deviation, and range of values for each numerical column, providing an initial quantitative assessment of the dataset. (See also annex 2 – descriptive statistics outputs).

The output generated from the code is a 7x7 matrix that provides a detailed descriptive analysis of various metrics.

Figure 5 – Python outputs - descriptive analysis

	Launched_Projects	Total_Dollars	Successful_Dollars	Unsuccessful_Dollars	Live_Dollars	Live_Projects	Success_Rate
<b>count</b>	15.000000	1.500000e+01	1.500000e+01	1.500000e+01	1.500000e+01	15.000000	15.000000
<b>mean</b>	40762.466667	5.145707e+08	4.707887e+08	3.983733e+07	3.260115e+06	202.733333	41.256000
<b>std</b>	27269.279397	7.104906e+08	6.621920e+08	4.637085e+07	5.629731e+06	193.546771	14.184101
<b>min</b>	4552.000000	1.623000e+07	1.503000e+07	1.180000e+06	1.875300e+04	7.000000	22.990000
<b>25%</b>	13957.500000	5.666500e+07	5.063000e+07	5.905000e+06	1.465605e+05	43.000000	29.065000
<b>50%</b>	39138.000000	2.348400e+08	2.148300e+08	2.258000e+07	7.280200e+05	165.000000	38.210000
<b>75%</b>	58881.000000	4.524800e+08	3.951000e+08	5.662500e+07	2.515000e+06	294.500000	49.515000
<b>max</b>	85117.000000	2.330000e+09	2.200000e+09	1.339700e+08	1.865000e+07	759.000000	66.220000

Focusing on the 'mean' values, we observe that the average number of launched projects per category is approximately 40,762. This figure offers insight into the typical level of activity within each Kickstarter category. Additionally, the mean value for 'Total\_Dollars' is approximately 514.57 million dollars, indicating a substantial flow of capital through Kickstarter projects. However, the high standard deviation in 'Total\_Dollars' and 'Successful\_Dollars' suggests significant variability in funding across categories. This variability implies that while some categories may attract considerable funding, others may receive much less, potentially due to differences in popularity or market demand.

The 'min' and 'max' values in the matrix expose the range of outcomes for Kickstarter projects. The minimum number of launched projects in a category stands at 4,552, whereas the maximum reaches 85,117, indicating that project saturation varies greatly across categories. The 'Total\_Dollars' also shows a wide range, from a minimum of approximately 16.23 million to a maximum of over 2.33 billion dollars, highlighting the diverse financial scales present within different project types.

The quartile values, including the '25%', '50%' (median), and '75%' figures, provide further insight into the data distribution. The median 'Success\_Rate' of 38.21% reveals that half of the categories have a lower success rate, while the other half exceed this rate. The '25%' and '75%' quartiles show that the majority of categories have a success rate below 50%, but a significant number surpass this rate, which may be influenced by various factors such as market trends, the quality of the projects, or specific characteristics of the categories. These quartile figures help in understanding the data's spread and the degree of skewness, offering a view of the success dynamics within platform's environment.

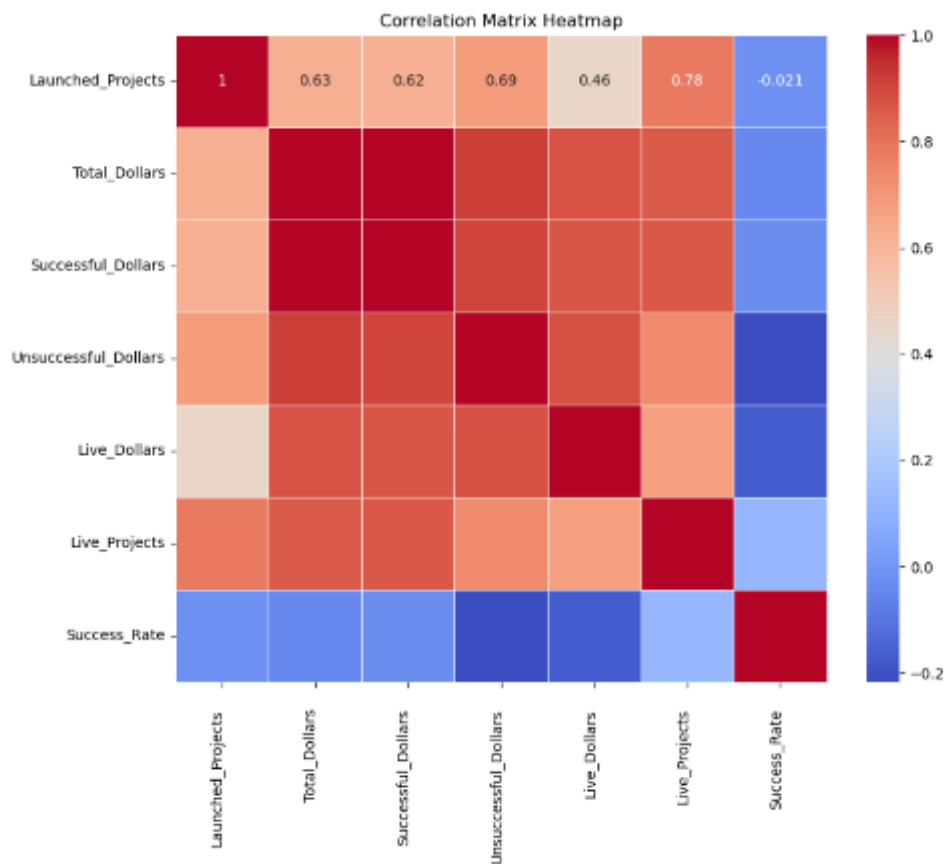
Subsequently, for analysis purposes, along with the statistical analysis, data visualization methods were applied to further examine the relationships and distributions of measurements within the Kickstarter dataset. Utilizing the matplotlib.pyplot and seaborn libraries, the code generates charts to visually present the data statistics and distributions.

The next step on the code involves the construction of a correlation matrix for the numerical variables, with the categorical 'Category' column omitted due to its non-numerical nature. This matrix is a table showing correlation coefficients between variables. Each cell in the table shows the correlation between two variables. The script then uses seaborn's heatmap function to transform this matrix into a color-coded chart, where the intensity of the color corresponds to the strength and direction of the correlation. Warm colors represent positive correlations, where variables move in tandem, and cool colors represent negative correlations, where variables move inversely to each other.

```
# Correlation Analysis (excluding 'Category' column)
correlation_matrix = df.drop(columns=['Category']).corr()
print(correlation_matrix)

# Heatmap for Correlation Matrix
plt.figure(figsize=(10, 8))
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm', linewidths=0.5)
plt.title('Correlation Matrix Heatmap')
plt.show()
```

Figure 6–Correlation matrix heatmap

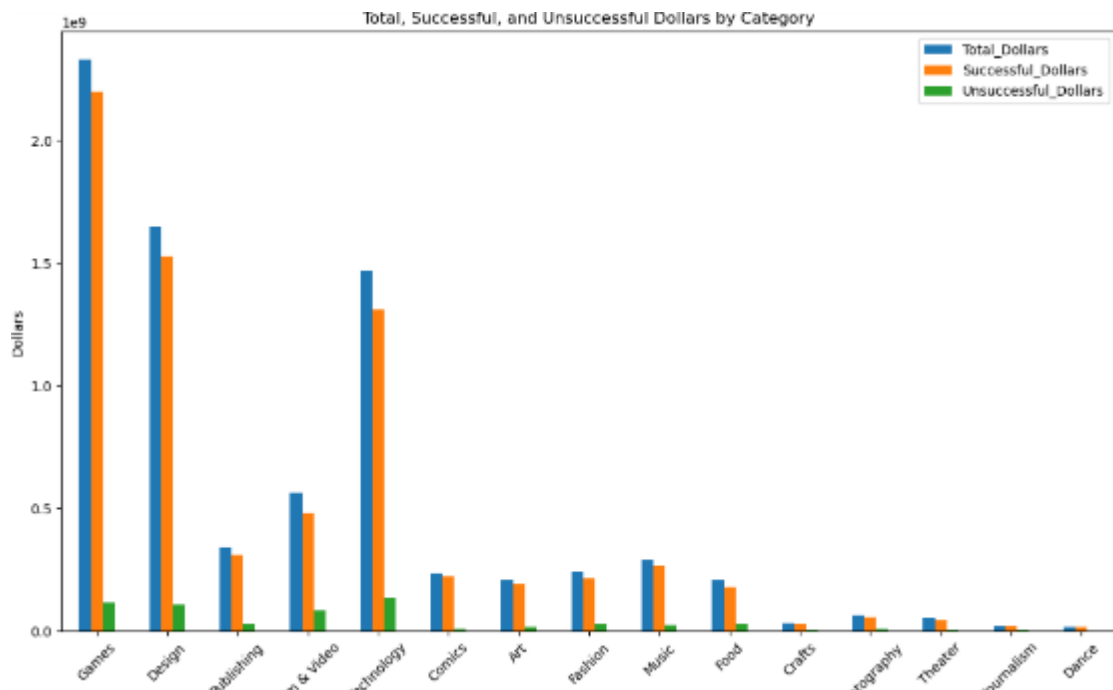


The correlation matrix indicated strong positive correlations between "Total Dollars" and "Successful Dollars," suggesting that higher total funding is often associated with successful projects. There were moderate correlations between "Launched Projects" and other funding metrics, indicating that categories with more projects tend to have higher overall funding.

Next, bar charts were created to compare the categories in terms of 'Total\_Dollars', 'Successful\_Dollars', and 'Unsuccessful\_Dollars'. This comparison helps in identifying which categories attract the most and least funding.

```
# Category Comparison: Bar Charts for Various Metrics
df = df_index('Category')[['Total_Dollars', 'Successful_Dollars', 'Unsuccessful_Dollars']].plot(kind='bar', figsize=(14, 8))
plt.title('Total, Successful, and Unsuccessful Dollars by Category')
plt.xlabel('Category')
plt.ylabel('Dollars')
plt.xticks(rotation=45)
plt.show()
```

Figure 7 – Volumes bar chart



The bar charts highlighted that "Games" received the highest total and successful funding, while "Technology" had the highest amount of unsuccessful funding, indicating potential challenges in meeting funding goals despite significant interest.

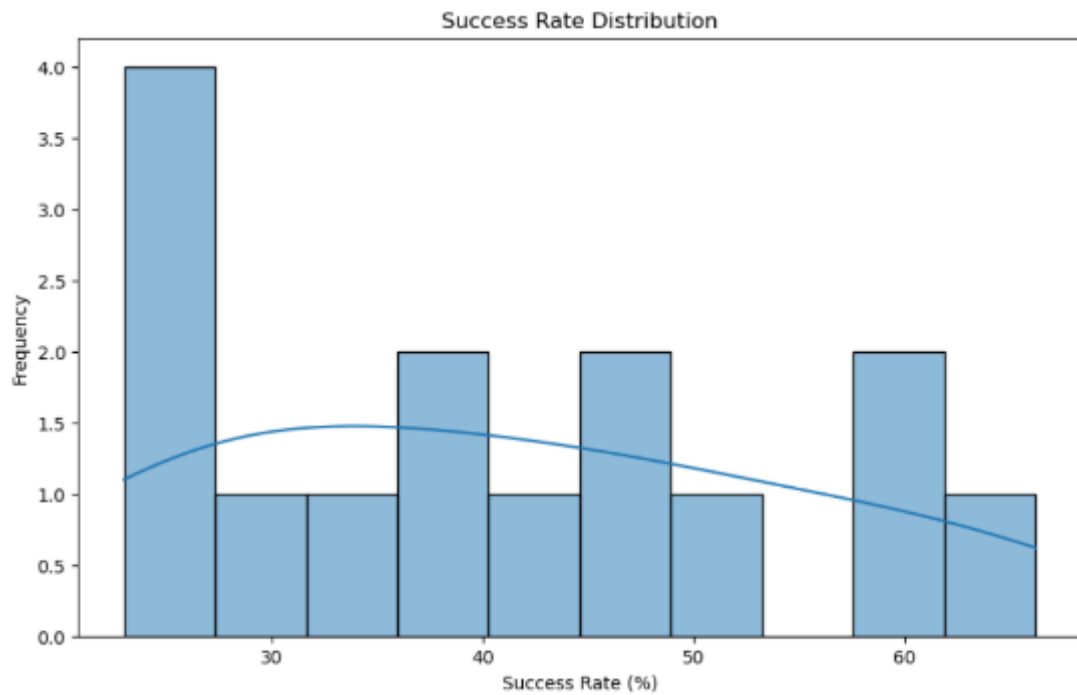
Additionally, the distribution of 'Success\_Rate' across categories was plotted using a histogram with Kernel Density Estimate (KDE). This analysis helps to understand which categories tend to have higher or lower success rates. Similarly, another histogram depicts the distribution of 'Total\_Dollars', providing a picture of how funding amounts are distributed across the various categories.

```
# Success Rate Distribution
plt.figure(figsize=(10, 6))
sns.histplot(df['Success_Rate'], bins=10, kde=True)
plt.title('Success Rate Distribution')
plt.xlabel('Success Rate (%)')
plt.ylabel('Frequency')
plt.show()

# Funding Amount Distribution
plt.figure(figsize=(10, 6))
sns.histplot(df['Total_Dollars'], bins=10, kde=True)
plt.title('Total Dollars Distribution')
plt.xlabel('Total Dollars')
plt.ylabel('Frequency')
plt.show()
```

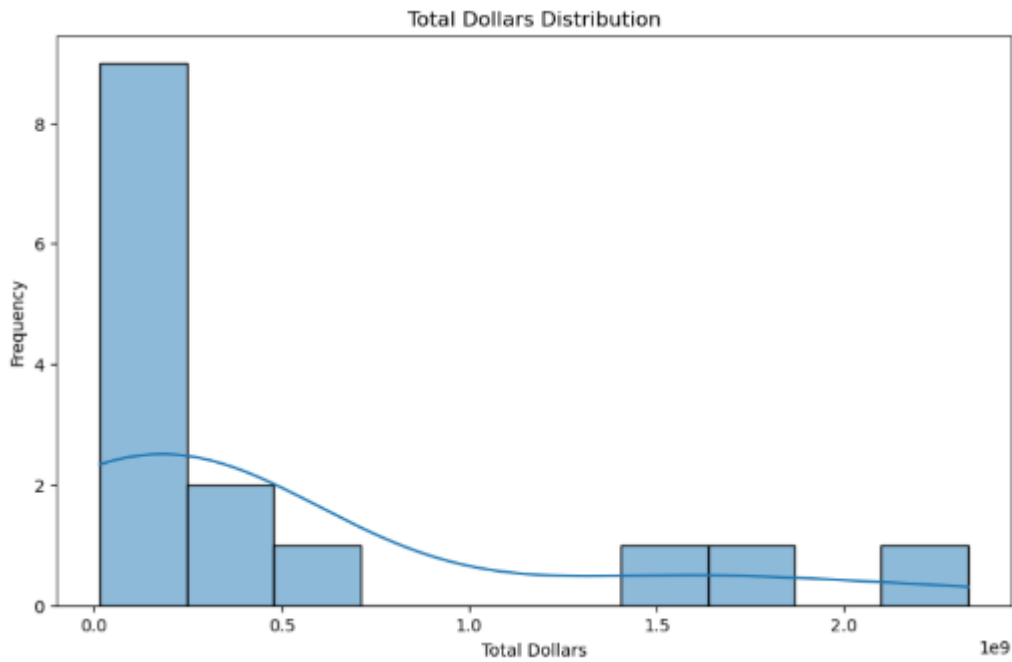


Figure 8 - Success rate distribution



The histogram showed that most categories have a success rate clustered around 30-50%, with notable outliers such as "Comics," which has a success rate exceeding 60%.

Figure 9 – Total dollars distribution



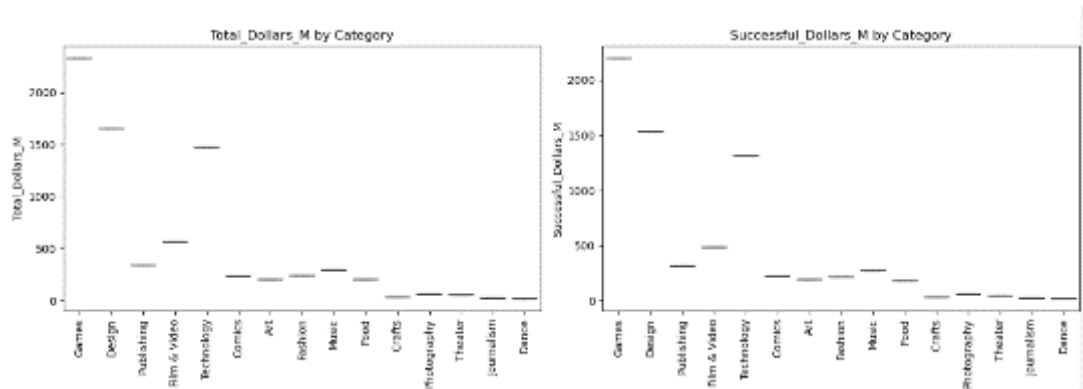
The distribution indicated that while most categories had moderate funding amounts, "Games" and "Design" had significantly higher total funding, indicating a skewed distribution with a few categories attracting the majority of the funds.

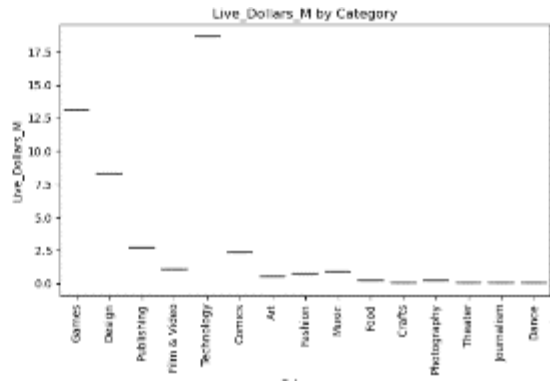
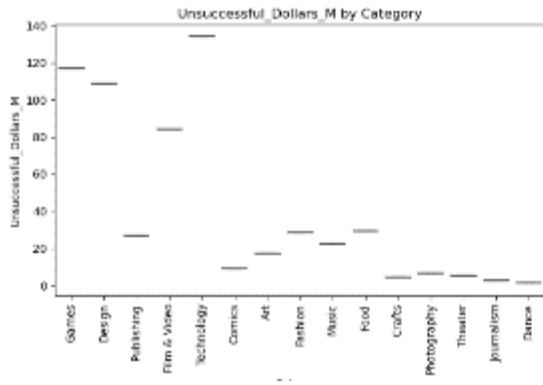
Lastly, the code creates box plots for several financial metrics, which are statistical graphics that provide a view of the data distribution through quartiles. Box plots show the median, the second and third quartiles, and any outliers that fall outside the interquartile range. These plots are generated for 'Total\_Dollars', 'Successful\_Dollars', 'Unsuccessful\_Dollars', and 'Live\_Dollars', offering a comparison of these metrics across the different Kickstarter categories.

```
# Box Plots for Various Metrics
metrics = ['Total_Dollars', 'Successful_Dollars', 'Unsuccessful_Dollars', 'Live_Dollars']
plt.figure(figsize=(14, 10))
for i, metric in enumerate(metrics, 1):
    plt.subplot(2, 2, i)
    sns.boxplot(x='Category', y=metric, data=df)
    plt.title(f'{metric} by Category')
    plt.xticks(rotation=90)
plt.tight_layout()
plt.show()
```

The box plots revealed significant variability within categories, with some categories exhibiting wide ranges and numerous outliers. "Games" consistently showed higher values across all funding metrics, reaffirming its dominance in the Kickstarter ecosystem.

Figure 10 - Box plots





## Considerations - Limitations

The study acknowledges several considerations - limitations that may impact the comprehensiveness and generalizability of the findings:

- **Data Timeframe:** The dataset utilized in this study captures information up to November 23 2023. Consequently, any trends, developments, or changes in project dynamics occurring after this date are not reflected in the analysis. This temporal limitation may affect the relevance and applicability of the findings to future states of the crowdfunding landscape, potentially omitting emerging patterns or shifts in backer behavior and project success rates.
- **Category Overlap:** The classification of projects into specific categories presents a methodological challenge due to the inherent overlap in some projects. Many projects are multifaceted and may span multiple categories, such as a technology-driven artistic endeavor or an educational game. This overlap can introduce ambiguity and affect the precision of category-specific analyses, potentially leading to misclassification or dilution of category-specific trends and insights.
- **Data exclusion:** The study excludes currently live projects from the success and failure rate calculations, as their outcomes remain undetermined at the time of data collection. This exclusion introduces a temporal bias, potentially skewing the success and failure rates. The absence of these live projects in the dataset means that the analysis may not fully capture the real-time dynamics and ongoing trends within the crowdfunding platform. Future research should consider incorporating methodologies to account for or predict the outcomes of live projects to provide a more holistic view of project success determinants.

## **Chapter 4 - Conclusions**

### **General conclusions**

This thesis has explored the multifaceted landscape of crowdfunding as a financing mechanism for startups, highlighting its potential to address the limitations of traditional funding sources. Through an analysis of empirical data, and case studies, key insights have emerged.

The conclusions drawn from this study are based on a literature review and the analysis of quantitative data from Kickstarter, as well as qualitative insights from Seedrs. The quantitative analysis of Kickstarter revealed significant insights into the performance of various project categories. Games and Design emerged as the most funded categories, indicating a high level of interest and investment potential. However, the analysis also highlighted considerable variability in success rates across categories, with some areas like Technology and Journalism facing substantial challenges in achieving their funding goals. The weak correlation between total funds raised and project success rates suggests that sheer funding volume does not guarantee higher success, underscoring the need for strategic planning and market understanding.

The case studies from Seedrs complement these findings by emphasizing the importance of transparency and security in crowdfunding. The rigorous due diligence processes and adherence to regulatory frameworks on Seedrs not only mitigate risks but also enhance investor confidence. These measures are critical in fostering a sustainable and trustworthy crowdfunding ecosystem. The case studies also highlighted diverse strategies employed by startups to engage with their community and secure funding, offering valuable lessons for future entrepreneurs.

Notably, different crowdfunding models serve distinct purposes and attract varied types of projects. Donation-based crowdfunding is effective for social and artistic endeavors, while reward-based crowdfunding acts as a pre-sale mechanism that provides early product validation. Equity-based crowdfunding aligns investor interests with long-term

venture success, and debt-based crowdfunding offers an alternative to traditional loans with flexible repayment expectations.

Blockchain technology significantly enhances crowdfunding platforms by improving transparency, security, and efficiency. By using a public ledger, blockchain creates immutable records of all transactions, ensuring that once a transaction is recorded, it cannot be altered or deleted (Tapscott & Tapscott, 2016). This level of transparency means that all participants, including fundraisers and investors, can track how funds are being used in real-time. This open visibility reduces the risk of fraud and increases trust among all parties involved, as they can verify the authenticity and integrity of transactions themselves.

Moreover, the integration of smart contracts—self-executing contracts with the terms directly written into code—automates and enforces the agreement processes without the need for intermediaries. These smart contracts automatically execute transactions when predefined conditions are met, reducing the need for manual oversight and significantly lowering operational costs. This not only streamlines the fundraising process but also provides a more secure environment for both fundraisers and investors, as the automation minimizes human error and manipulation.

The success of crowdfunding campaigns hinges on several critical factors. First and foremost, the clarity and appeal of the project pitch are essential (Mollick, 2014). A well-crafted pitch should clearly articulate the project's purpose, goals, and benefits, capturing the interest and imagination of potential backers. The credibility of the founding team also plays a pivotal role (Gerber & Hui, 2013), backers are more likely to support a project if they believe the team has the necessary expertise and experience to deliver on their promises. Demonstrating past successes and providing detailed bios can enhance the team's credibility.

Effective use of social media and active community engagement are also vital. Social media platforms serve as powerful tools for spreading the word about the campaign, reaching a broader audience, and fostering a sense of community among backers. Engaging with potential and existing backers through regular updates and transparent communication is crucial in maintaining momentum. These updates not only keep backers informed about the project's progress but also help build trust and loyalty.

Transparent communication ensures that backers feel valued and involved, increasing the likelihood of continued support and organic promotion, which are key to a campaign's sustained success.

Crowdfunding presents several distinct advantages over traditional funding methods, making it an increasingly popular option for startups and small businesses. One of the most significant benefits is the faster funding cycles (Agrawal et al., 2015). Traditional funding methods, such as bank loans or venture capital, often involve lengthy application processes, rigorous scrutiny, and extensive paperwork. In contrast, crowdfunding campaigns can be set up and launched relatively quickly, allowing entrepreneurs to raise funds in a shorter time frame (Mollick, 2014). This speed can be crucial for startups that need immediate capital to kickstart their projects (Belleflamme et al., 2014).

Additionally, crowdfunding offers more flexible cost structures compared to traditional funding. Traditional methods often come with stringent repayment terms and interest rates, which can be burdensome for new businesses (Mollick, 2014). Crowdfunding, on the other hand, typically involves raising small amounts of money from a large number of backers, reducing financial pressure on the startup. Moreover, because funds are raised in exchange for rewards, equity, or future products rather than debt, businesses can avoid the heavy financial obligations associated with loans (Belleflamme, Lambert, & Schwienbacher, 2014).

Another key advantage of crowdfunding is the opportunity for direct market engagement. By launching a crowdfunding campaign, startups can engage directly with potential customers and gather valuable market feedback before fully developing their products (Belleflamme et al., 2014). This interaction helps validate the market demand and allows for adjustments based on backer input, increasing the likelihood of a successful product launch. Additionally, crowdfunding helps build a supportive community around the project, fostering a sense of loyalty and advocacy among backers. This community can provide ongoing support, not just financially, but also through organic promotion and user feedback, which are invaluable assets for any startup (Ordanini, Miceli, Pizzetti, & Parasuraman, 2011).

## **Challenges and opportunities**

While crowdfunding offers numerous benefits, it also presents challenges. Regulatory hurdles, market saturation, and the potential for project failure are significant concerns. (Hornuf & Schwienbacher, 2017). Hornuf and Schwienbacher (2017) call for balanced regulations that protect investors without stifling innovation. They argue that overregulation could hinder the growth of crowdfunding, while under-regulation could lead to fraud and market instability. Market saturation is another challenge, as the increasing number of campaigns makes it difficult for individual projects to stand out (Borst, Moser, & Ferguson, 2018).

On the opportunity side, advancements in blockchain technology and smart contracts offer new ways to enhance transparency and security in crowdfunding. Technologies that provide immutable records of transactions can significantly reduce the risk of fraud and increase investor trust. Furthermore, the emergence of niche crowdfunding platforms allows for more targeted and effective fundraising efforts.

The potential for project failure remains a persistent challenge in crowdfunding. While the democratization of capital allows for a wide range of ideas to seek funding, it also increases the likelihood of investing in projects that may not succeed (Agrawal, Catalini, & Goldfarb, 2015). Investors face the risk of losing their contributions if a project fails to deliver as promised, highlighting the importance of due diligence and risk management in crowdfunding investments.

However, amidst these challenges, there are significant opportunities for innovation and growth in the crowdfunding landscape. Blockchain technology, with its decentralized and transparent nature, holds promise for addressing regulatory and security concerns in crowdfunding.

Balanced regulations, technological advancements, and the emergence of niche platforms can address some of the challenges while enhancing the efficiency, transparency, and inclusivity of crowdfunding as a financing mechanism for entrepreneurs and creators (Hornuf & Schwienbacher, 2017).



## **Strategic recommendations for stakeholders**

The main stakeholders in crowdfunding are defined as entrepreneurs, investors, and policymakers (Belleflamme et al., 2014). Entrepreneurs constitute a pivotal stakeholder group due to their role in initiating and managing crowdfunding campaigns, relying on these platforms to secure vital early-stage funding and engage directly with backers. Investors play a crucial role as financial supporters, contributing capital to projects based on their assessments of risk and potential returns. Policymakers are integral stakeholders tasked with creating and enforcing regulatory frameworks that ensure transparency, protect investors, and foster a conducive environment for crowdfunding to thrive (Hornuf & Schwienbacher, 2017). The thesis concludes to the below recommendations for each of the main stakeholders:

**Entrepreneurs:** Effective utilization of transparent and compelling campaign narratives emerges as a cornerstone for crowdfunding success. Pre-campaign marketing efforts are instrumental in cultivating a community of potential backers, underscoring the importance of early engagement and relationship building (Brown, Boon, & Pitt, 2017). Furthermore, maintaining ongoing communication through regular updates is essential to nurturing backer trust and sustaining interest throughout the campaign period. Careful consideration of crowdfunding models tailored to project-specific goals and funding requirements is advised, ensuring alignment with strategic objectives. Leveraging social media platforms strategically serves as a powerful tool for expanding reach and attracting diverse backers (Borst et al., 2018).

**Investors:** Informed decision-making is paramount for investors participating in crowdfunding campaigns. Conducting thorough due diligence, particularly focusing on platforms with robust security protocols, mitigates risks associated with investment (Moysidou & Hausberg, 2020). Preference should be given to campaigns that prioritize transparency, providing detailed disclosures regarding project viability, risks, and financial projections (Agrawal et al., 2015). Diversifying investments across multiple projects within the crowdfunding ecosystem serves as a prudent risk management strategy, enhancing portfolio resilience and potential returns (Bouncken et al., 2015).

Policymakers: The role of policymakers is critical in fostering a conducive environment for crowdfunding while safeguarding investor interests. Developing regulatory frameworks that strike a balance between promoting innovation and ensuring investor protection is imperative (Hornuf & Schwienbacher, 2017). Encouraging adherence to best practices in transparency and security among crowdfunding platforms through regulatory oversight facilitates market integrity and investor confidence (Belleflamme et al., 2014). Furthermore, supporting educational initiatives aimed at enhancing public awareness and understanding of crowdfunding mechanisms fosters a more informed investor base. Clear and adaptive regulatory guidelines are essential for promoting sustainable growth and resilience in the crowdfunding sector (Hornuf & Schwienbacher, 2017).

### **Future research directions**

Future research could explore several key areas to advance understanding and practice in crowdfunding and startup financing. Firstly, assessing the long-term sustainability and success rates of startups funded through crowdfunding compared to traditional financing methods would provide valuable insights into the efficacy and durability of crowdfunding as a funding source. Secondly, investigating the impact of emerging technologies, particularly blockchain, on the evolution of crowdfunding platforms and practices could uncover novel avenues for enhancing transparency, security, and efficiency within the ecosystem. Additionally, exploring the effectiveness of different crowdfunding models across various industries and entrepreneurial contexts would contribute to optimizing strategies tailored to specific market dynamics and project needs. Lastly, there is a critical need for standardized processes and frameworks ("process standardization") to enhance the reliability and comparability of crowdfunding outcomes, fostering greater confidence among stakeholders and facilitating informed decision-making. Addressing these research directions can further refine the understanding and application of crowdfunding as a pivotal tool in modern startup financing landscapes.

# Annexes

## Annex 1: Python code

```
[1]: import pandas as pd

# Load the data from the provided text into a DataFrame
data = {
    'Category': ['Games', 'Design', 'Publishing', 'Film & Video', 'Technology', 'Comics', 'Art', 'Fashion', 'Music', 'Food', 'Crafts', 'Photography', 'Theater', 'Education', 'Health & Wellness', 'Automotive', 'Travel', 'Real Estate', 'Finance', 'Retail', 'E-commerce', 'Energy', 'Agriculture', 'Manufacturing', 'Construction', 'Transportation', 'Aerospace', 'Defense', 'Telecommunications', 'Media', 'Entertainment', 'Sports', 'Fashion', 'Beauty', 'Food & Beverage', 'Pharmaceuticals', 'Biotechnology', 'Automotive', 'Aerospace', 'Defense', 'Telecommunications', 'Media', 'Entertainment', 'Sports', 'Fashion', 'Beauty', 'Food & Beverage', 'Pharmaceuticals', 'Biotechnology'],
    'Launched_Projects': [82314, 54049, 63713, 85117, 53116, 26456, 51679, 39138, 69120, 34757, 14016, 13899, 13153, 6358, 4552],
    'Total_Dollars': [2330000000, 1650000000, 3405900000, 5643700000, 1470000000, 2348400000, 2066300000, 2439700000, 2897900000, 2062700000, 313900000, 627700000],
    'Successful_Dollars': [2200000000, 1530000000, 3109700000, 4792300000, 1310000000, 2232000000, 1886500000, 2148300000, 2663500000, 1768100000, 270500000, 557000000],
    'Unsuccessful_Dollars': [1169700000, 1087800000, 269100000, 840400000, 1339700000, 93200000, 174300000, 284100000, 225800000, 292100000, 4300000, 6730000, 5080000],
    'Live_Dollars': [13100000, 8250000, 2710000, 1100000, 18650000, 2320000, 551190, 728020, 862000, 248140, 42564, 254450, 21620, 44981, 18753],
    'Live_Projects': [759, 317, 314, 299, 290, 278, 207, 165, 162, 119, 45, 41, 24, 14, 7],
    'Success_Rate': [48.61, 42.49, 37.62, 38.21, 22.99, 66.22, 48.55, 31.03, 50.42, 26.02, 27.10, 34.97, 59.88, 23.41, 61.32]
}

df = pd.DataFrame(data)

# Perform descriptive statistics
descriptive_stats = df.describe()

descriptive_stats

import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

# Data
data = {
    'Category': ['Games', 'Design', 'Publishing', 'Film & Video', 'Technology', 'Comics', 'Art', 'Fashion', 'Music', 'Food', 'Crafts', 'Photography', 'Theater', 'Education', 'Health & Wellness', 'Automotive', 'Travel', 'Real Estate', 'Finance', 'Retail', 'E-commerce', 'Energy', 'Agriculture', 'Manufacturing', 'Construction', 'Transportation', 'Aerospace', 'Defense', 'Telecommunications', 'Media', 'Entertainment', 'Sports', 'Fashion', 'Beauty', 'Food & Beverage', 'Pharmaceuticals', 'Biotechnology', 'Automotive', 'Aerospace', 'Defense', 'Telecommunications', 'Media', 'Entertainment', 'Sports', 'Fashion', 'Beauty', 'Food & Beverage', 'Pharmaceuticals', 'Biotechnology'],
    'Launched_Projects': [82314, 54049, 63713, 85117, 53116, 26456, 51679, 39138, 69120, 34757, 14016, 13899, 13153, 6358, 4552],
    'Total_Dollars': [2330000000, 1650000000, 3405900000, 5643700000, 1470000000, 2348400000, 2066300000, 2439700000, 2897900000, 2062700000, 313900000, 627700000],
    'Successful_Dollars': [2200000000, 1530000000, 3109700000, 4792300000, 1310000000, 2232000000, 1886500000, 2148300000, 2663500000, 1768100000, 270500000, 557000000],
    'Unsuccessful_Dollars': [1169700000, 1087800000, 269100000, 840400000, 1339700000, 93200000, 174300000, 284100000, 225800000, 292100000, 4300000, 6730000, 5080000],
    'Live_Dollars': [13100000, 8250000, 2710000, 1100000, 18650000, 2320000, 551190, 728020, 862000, 248140, 42564, 254450, 21620, 44981, 18753],
    'Live_Projects': [759, 317, 314, 299, 290, 278, 207, 165, 162, 119, 45, 41, 24, 14, 7],
    'Success_Rate': [48.61, 42.49, 37.62, 38.21, 22.99, 66.22, 48.55, 31.03, 50.42, 26.02, 27.10, 34.97, 59.88, 23.41, 61.32]
}

# Create DataFrame
df = pd.DataFrame(data)

# Correlation Analysis (excluding 'Category' column)
correlation_matrix = df.drop(columns=['Category']).corr()
print(correlation_matrix)

# Heatmap for Correlation Matrix
plt.figure(figsize=(10, 8))
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm', linewidths=0.5)
plt.title('Correlation Matrix Heatmap')
plt.show()

# Category Comparison: Bar Charts for Various Metrics
df.set_index('Category')[['Total_Dollars', 'Successful_Dollars', 'Unsuccessful_Dollars']].plot(kind='bar', figsize=(14, 8))
plt.title('Total, Successful, and Unsuccessful Dollars by Category')
plt.xlabel('Category')
plt.ylabel('Dollars')
plt.xticks(rotation=45)
plt.show()
```

```

# Success Rate Distribution
plt.figure(figsize=(10, 6))
sns.histplot(df['Success_Rate'], bins=10, kde=True)
plt.title('Success Rate Distribution')
plt.xlabel('Success Rate (%)')
plt.ylabel('Frequency')
plt.show()

# Funding Amount Distribution
plt.figure(figsize=(10, 6))
sns.histplot(df['Total_Dollars'], bins=10, kde=True)
plt.title('Total Dollars Distribution')
plt.xlabel('Total Dollars')
plt.ylabel('Frequency')
plt.show()

# Box Plots for Various Metrics
metrics = ['Total_Dollars', 'Successful_Dollars', 'Unsuccessful_Dollars', 'Live_Dollars']
plt.figure(figsize=(14, 10))
for i, metric in enumerate(metrics, 1):
    plt.subplot(2, 2, i)
    sns.boxplot(x='Category', y=metric, data=df)
    plt.title(f'{metric} by Category')
    plt.xticks(rotation=90)
plt.tight_layout()
plt.show()

```

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