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Master Thesis

Project management and project failure for crowdfunded computer game projects

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Abstract

Crowdfunding platforms such as Kickstarter provide an avenue to crowdfund money for specific or niche products and services. Unfortunately, not every project that gets funded delivers successfully. The goal of this research was to look into the project failure of a 100 Kickstarter videogame projects and the possible reasons for those failures. This was done through the assembly of a data set containing a 100 Kickstarter videogame projects that got funded in 2017, after which the same data set was analyzed for insights. The research has shown that 46 of the 100 projects failed, with the remaining projects consisting of 29 challenged projects and 25 successful ones. The most prominent risks pertained to projects their funding goal and eventual funding, the choice of graphical dimension, lack of project roadmap and team composition. Consequently, project creators were advised to take note of those factors and anticipate methods to counteract possible risks. Potential backers were advised to opt for 2D game projects with teams of at least two or more people, a funding goal of more than $10.000,- and a funding percentage higher than 113%.

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Introduction

Crowdfunding platforms, such as Kickstarter(12), Indiegogo(9) and Patreon(25) provide avenues to propose creative projects to people who might be interested in specific or niche products and services. Interested enough to financially back those projects with their own money and possibly get them involved in the creation process(27). Both Kickstarter and the other two platforms host a variety of creative projects, with videogames being among them. Kickstarter campaigns for videogames can range from newcomers to the gaming industry like Darkest Dungeon(A.2) to sequels like Shenmue 3(A.2) or spiritual successors to renowned series like Bloodstained: Ritual of the Night(A.2). Kickstarter allows both newcomers and established figures to enter or remain in the video game industry by giving them an opportunity to present their ideas and hopefully gain financial backing.

While Kickstarter projects deemed interesting may reach their funding goals or even get vastly overfunded(26), unfortunately, not all of them manage to deliver on time or even at all(6)(33). In addition to being creative projects, videogames are also IT projects due to the technical aspects. Unfortunately, IT projects have a high rate of failure(32).

1.1 Motivation

It is unfortunate when promising ideas cannot deliver what they proposed, even if they had been adequately funded. An infamous case of a videogame project on Kickstarter is Star Citizen(A.2), an ambitious project that collected over 2 million dollars when it got funded in 2012. As of 2022, Star Citizen has collected over 400 million dollars through crowdfunding(28) on their own website. However, the project has yet to deliver a full version 1.0 product, with the game still being in an alpha state(29). People across the

gaming community, both backers(10) and non-backers(41) are dismayed in regards to how the project has been handled.

Another case where a Kickstarter project got funded but did not manage to deliver is Yogventures!(A.2), a project that reached its funding goal in 2012 and eventually fell apart in 2014 after several issues during development. The final status update for the project consisted of the project lead explaining the circumstances around the project falling apart. The issues were mostly related to staff, contractual and financial shortcomings. The project lead ended the status update with admitting that his inexperience was part of the blame for the studio not succeeding with the project.

Unfortunately, there are also cases where the funding for a project has been misused. Such as Ant Simulator(A.2), a Kickstarter project which was meant to result in a VR experience where you play as an ant. Instead, two of the three people involved in the project secretly spent a majority of the money on bars, restaurants and other things that the money was not meant for. Making the project look like a scam, at least on the part of the two people that misused the money. The campaign page for this Kickstarter project was also removed.

With the aforementioned cases being examples of videogame Kickstarter projects that did not go well and either did not deliver on time or at all, it would be beneficial for future projects to know how to improve the development and management of their crowdfunded projects. There are also Kickstarter projects that output highly successful videogames. Such as Shovel KnightA.2, which has been positively reviewed(19) and even won several awards(2)(38). It would also be beneficial for potential backers of Kickstarter projects to know how to identify high risk Kickstarter projects, so they can avoid them to save their money and avoid potential disappointment. Instead, backing projects that are more likely to deliver a good product.

1.2 Problem definition

Some prior research into the success rate of Kickstarter projects reported a failure rate of 9%(22), while other sources indicate that up to 37%(6) of projects are not successful. While there is not a strict legal obligation for Kickstarter campaigns to deliver what can be considered a full product within a certain time frame(16), the problem is that the failure rate for IT-projects, including the ones crowdfunded on platforms like Kickstarter is too high. Funded projects can end up being delayed or fail to deliver the planned product for

various reasons. Even if a project ends up delivering a product, the product can be of poor quality and the project thus seen as unsuccessful.

1.3 Research question(s)

To research how videogame Kickstarter projects might fail to deliver, the following main research question has been formulated:

- What is the failure rate of crowdfunded video games to deliver on time and what are the reasons?

This question actually consists of two parts that were split off into subquestions, with the first part being the failure rate and the reasons for the failure being the second part.

The first subquestion, which is about the failure rate has been formulated as follows:

- What is, based on a representative sample, the estimated failure rate of Kickstarter-funded videogame projects?

The second subquestion, which is about the reasons for those failures has been formulated as follows:

- What are the key factors that lead to the failure of a Kickstarter videogame project?

The answers to the subquestions were used to answer the main question, resulting in a scientific and practical contribution.

1.4 Scientific and practical contribution of research

The purpose of this research was to look into the failure rate of videogame Kickstarter projects, including the reasons for those failures. While there has been prior research around the delivery rates of crowdfunded projects(6)(33)(22), few specifically research the delivery rate and thus the ultimate success of crowdfunded videogame development projects. The main result of this research was a data set which can be found in appendix A.1, consisting of crowdfunded video game projects, with the projects their characteristics and success rates. This data set can be used to build data science models to predict project success. Additionally, it could be expanded with more videogames to improve said models

if needed. The prediction models could then be used to improve the project management of crowdfunded projects in addition to the proposed measures in section 6.1.1.

The practical contribution of this research aimed to not only help future Kickstarter projects, but also potential Kickstarter backers. The contribution for potential Kickstarter backers were insights into factors that could lead to the failure of projects. Those factors were used to create decision trees in section 6.2, which can help potential backers with their decision to support crowdfunded projects. For the project creators themselves, the research its purpose was to provide project management advice based on factors that appeared in failed projects. So future projects could avoid the mistakes of the projects that failed and apply project management practices to avoids risks that lead to failure.

Both Kickstarter creators and potential backers could consult the data set to look into failed and successful projects on a case-by-case basis. For both this purpose and the scientific and practical contribution, it was important that the data set had been assembled in a way that suits both purposes.

1.4.1 FAIR data

For both the scientific and practical contribution, the assembled data set had to be usable for future reference and work, FAIR data principles(39)(34)(7) have been applied to ensure that the data set is findable and reusable by third-parties. These principles consist of four aspects: Findability, Accessibility, Interoperability and Reuse. Each principle has been divided into four sub-clauses, which can be seen in the tables below:

Table 1.1: Findability sub-clauses

Findability	
F1	(Meta)data are assigned a globally unique and persistent identifier
F2	Data are described with rich metadata (defined by R1 below)
F3	Metadata clearly and explicitly include the identifier of the data they describe
F4	(Meta)data are registered or indexed in a searchable resource

The data set has been made findable by being available on this page provided by the ICT Institute: `https://ictinstitute.nl/kickstarter-succes-video-game-dataset/`. Furthermore, Each column in the data set has its own explanation, which can be found in a sheet named "Explanation" in the same file, as the file format for the data set is a Microsoft-Excel workbook.

Table 1.2: Accessibility sub-clauses

Accessibility	
A1	(Meta)data are retrievable by their identifier using a standardised communications protocol
A1.1	The protocol is open, free, and universally implementable
A1.2	The protocol allows for an authentication and authorisation procedure, where necessary
A2	Metadata are accessible, even when the data are no longer available

The data can be read and used by anyone. If needed, the metadata for the data set can be copied to another file for safekeeping.

Table 1.3: Interoperability sub-clauses

Interoperability	
I1	(Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation
I2	(Meta)data use vocabularies that follow FAIR principles
I3	(Meta)data include qualified references to other (meta)data

The metadata for the data set describes each column in detail, which helps with the use of the data in different applications. Due to the data set being in a Microsoft-Excel Workbook format, it is usable with different types of software. Such as Tableau and Microsoft Excel which were used for this research.

Table 1.4: Reuse sub-clauses

Reuse	
R1	Meta(data) are richly described with a plurality of accurate and relevant attributes
R1.1	(Meta)data are released with a clear and accessible data usage license
R1.2	(Meta)data are associated with detailed provenance
R.3	(Meta)data meet domain-relevant community standards

The metadata explains the data set columns in a clear and concise manner. The explanation for each column should help people that are using the data set, in case they want to extend the set with additional data. While adhering to the principles that the data set was constructed with.

1.5 Theories and hypothesis

Based on prior research in section 2, a number of theories had been formulated, these theories were used to analyze the data set on factors that could predict whether a project was going to deliver on time:

Table 1.5: Hypotheses

Subsection & Source(s)	Theory
2.1:(21)	Overfunded Kickstarter projects will have a higher chance of successful delivery
2.1:(21)(15)	Barely funded Kickstarter projects will have a lower chance of successful delivery
2.1:(21)	Projects with high funding goals will have a higher chance of successful delivery
2.1:	Crowdfunded videogame projects without gameplay footage in campaign trailer will have a higher degree of slippage
2.1:	Multiplatform videogame projects will have a higher degree of slippage compared to single platform videogame projects
2.1:	3D videogame projects will have a higher degree of slippage compared to 2D videogame projects
2.2:(3)	Inexperienced teams are more likely to delay
2.2	Projects aware of possible risks are more likely to deliver on time
2.2: (23)	Projects that include online capabilities will have a higher degree of slippage
2.4: (32)(40)	Projects divided up in smaller steps are more likely to deliver on time
2.4: (4)	Projects are more likely to deliver on time with bigger teams

Based on prior research the following hypothesis was formulated:

- IT projects have a failure rate above 30%, regardless of domain, type, size or project management method

Further elaboration of the hypothesis can be found in section 4.1.1.

2

Related Literature

The following chapter discusses literature with topics such as crowdfunding, project management, video games and the judgement of those video games.

2.1 The funding in crowdfunding

Eveleens(6), van Dongen(33) and Mollick(21) researched the dynamics surrounding crowdfunding projects, both before and after a project had been funded. Mollick found several factors that were significant in the timing of the projects their delivery. One of those factors was the amount of funding a project had received, noting that projects which got overfunded in addition to being successful unexpectedly were at risk of suffering from problems due to the possibility of increased expectations. An unexpected amount of overfunding might also make it possible for the project to have an expanded scope or increased complexity, which Mollick noted could contribute to additional delays of a crowdfunded project. Another discussed aspect was that projects might get delayed if it turned out that initial funding or knowledge was not enough, contrary to more conventional projects where new knowledge can be applied during development. Because crowdfunded projects have to deliver something before being able to learn something to help their process or apply new knowledge. In a similar sense, crowdfunded projects cannot request additional funding like a conventional project can from investors. Especially on Kickstarter, where the opportunity to request funds closes after the funding goal has been reached and the funding period is over(15). Mollick also found that Kickstarter projects have a failure rate of around 9%(22), which seems low considering other research surrounding the topic of crowdfunded projects and projects in general.

Van Dongen contacted crowdfunding platforms regarding their rules and requirements for crowdfunding projects, among them were Kickstarter and Indiegogo. Unfortunately, Kickstarter did not respond to van Dongen. The response of Indiegogo and other platforms was summarized as platforms having teams and/or monitoring systems to check projects for compliance, with honesty being important but understanding why CGI for example might be needed to present something convincing. There were no funding goal requirements stated but they do expect project creators to set the goal at an achievable number. Crowdfunding platforms do not investigate failed projects but do regularly look into why they fail and the last one pertained to risk sections on campaign pages, with Ulele providing a standard list of risks. The question about CGI was relevant to the visual showcase of a project, as project creators could use CGI in lieu of actual footage for their promotion material. However, misusing CGI might result in a project breaking one of Kickstarter their rules(14) regarding honesty(14). Especially if a shown feature might not be present in the final release of a project their end-product.

In that regard, creators can maintain transparency and consequently honesty as much as possibly through updating their backers through status updates, on Kickstarter it can be done through the "updates" tab. As Ribeiro-Navarrete et al.(30) noted, one of the key factors involved in the satisfaction of crowdfunding backers is communication and making sure there is a minimum amount of information asymmetry. Availability of information was also noted to be a quality signal by Agrawal et al.(1) of a project that might end up delivering, possibly indicating that a certain level of transparency shows commitment and confidence from the group behind a project.

2.2 Project risks

Woortman(40), Boehm(3) and Chaos(11) discussed several risks associated with IT projects. A mentioned factor by all of them was poor budgeting. Additionally, insufficient resources were also mentioned as one of the most occurring project risks by Woortman. Woortman also mentioned dependency on a few key people as one of the most occuring project risks, Boehm similarly mentioned personnel shortfalls as a risk to software development. Agrawal et al.(1) specifically discussed "creator incompetence", as inexperience may lead to delays due to multiple unforeseen issues. Boehm also mentioned how unrealistic schedules and budgets are a risk to software projects, additionally, Woortman described insufficient resources as one of the risks with the highest probability to occur, likewise with the risk of scope extensions, a risk that is highly relevant to the subject of crowdfunded projects

in the case of stretch goals. Eveleens(6) and van Dongen(33) both summarized a list which contained risks from Woortman for their research on crowdfunded project fulfillment. Woortman compiled those risks by consulting the NPR 5326(24), a report on risk management during software development. The list can be found in appendix A.3, it contains the NPR 5326 risks in addition to some risks from Woortman their research.

An aspect to the development of specifically videogames is whether a game will be supporting online capabilities, as the inclusion of online functions might complexify the development. Morgan(23) noted that depending on the depth of online functions, a significant portion of the project resources might have to be dedicated to the development of the online architecture for the videogame. Additionally, a video game with online components could be more costly compared to those without, which could increase the likelihood of risks occurring.

2.3 Examples of failed projects

A case in which kickstarter did a detailed investigation into the reasons for project failure is Zano(8)(A.2); a small drone that could be controlled through a smartphone and take pictures. The project gathered more than 2.3 million British pounds, which was nearly twenty times the amount of their original funding goal as the project gained success. However, multiple things went wrong as the project creators expanded their scope due to the extra amount of money they were able to gather. The problems kept increasing as it turned out that their production line was not fully operational and the possibility that some aspects of the campaign were misleading as the Zano was not functional yet to the degree it was advertised, in addition to the information that the company its previous endeavors did not consist of similar products which implied inexperience.

The Coolest Cooler(31)(A.2) was another Kickstarter project that ended in an unfortunate manner, as the project creators reasoned that tariffs on imported products from China made it difficult for them to produce the coolers. However, that was not the first challenge for the Coolest Cooler, as there were several other issues with the project. Such as the Cooler being sold for $99,- while not every backer that backed the project for $185,- got their cooler yet. Ryan Grepper, creator of the project, said that they needed to start selling coolers to afford the production to hopefully fulfill their Kickstarter backers. Coolest Coolers did give unfulfilled backers the option to request a refund up to $20,-, as per the Oregon Department of Justice AVC agreement.

Pebble Technology(37)(A.2) was another company that funded multiple of their smartwatches through Kickstarter, gathering millions from their backers each time but eventually failing. After the third funding campaign which was for their Pebble Time product. the company had to file for insolvency, selling assets to FitBit and being in debt. Consequently failing to deliver the product.

2.4 Known measures to prevent project failure

In addition to risks, Woortman(40), Boehm(3) and NEN(24) also noted measures to counteract those risks. One of them being smaller and measurable project milestones, an example of this could be documenting a roadmap for the project. It would give the developers a clear view of what they still need to do while working on the project, additionally, it could allow for a degree of transparancy if the roadmap is presented to the people that are waiting on the project its output. Some game developers opt to release their games in a work-in-progress state, a state in which a videogame is still in active development, lacking features, full of bugs or both(17). After which they will publish a roadmap to their customers to show how they intend develop the game into a full state. However, this was not recommended by the CHAOS report(32), as software that is not finished or functional could be qualified as unsatisfactory.

Another noted factor was the development team itself, with Boehm mentioning that the recruitment of top talent and teambuilding should counteract personnel shortfalls. Agrawal et al.(1) also noted that a development team consisting of experienced staff as a quality factor. Cha(4) hypothesized that "Human Capital" could be of influence on the success of a videogame Kickstarter campaign. It is also possible this applies to the delivery of the project, since videogame development encompasses not only software development, but also art and audio design while possibly also needing an online infrastructure depending on the project. Eveleens(6) and van Dongen(33) also both summarized a list which contained measures against risks from Woortman for their research on crowdfunded project fulfillment. Woortman compiled those measures by consulting the NPR 5326(24), the list can be found in AppendixA.4.

2.5 Software development and general Kickstarter success rates

The Standish Group International publishes the CHAOS report(32) every few years, with the report consisting of success rates of IT projects. With video games being software, the CHAOS report is relevant as it is applicable to software development and consequently game development. In 2015, the report showed that as projects increase in size, the rate of success lowers. Not all unsuccessful projects were deemed failures, the CHAOS report also categorized some projects as challenged. These projects were delivered, but they were categorized as being challenged due to either being over budget, delayed or not fully completed according to its original scope. To determine this success rate, the Standish Group International applied a modern resolution definition. Consisting of whether a project was OnTime and OnBudget with a satisfactory result.

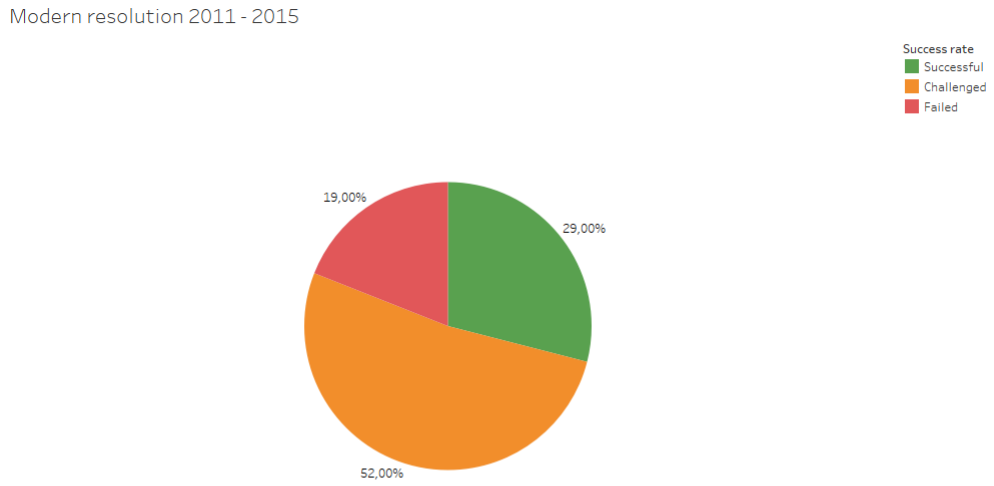

Figure 2.1: Average resolution rate consisting of OnTime and Onbudget with a satisfactory result for projects in the CHAOS database from 2011-2015(32)

Van Otterloo(35) provided a data set containing 35 Kickstarter projects from various categories. It should be noted that for these projects, only the timing of delivery was provided. With projects delivering before or within 6 months after their planned date being successful, projects delivering within 6 to 24 months being considered challenged and

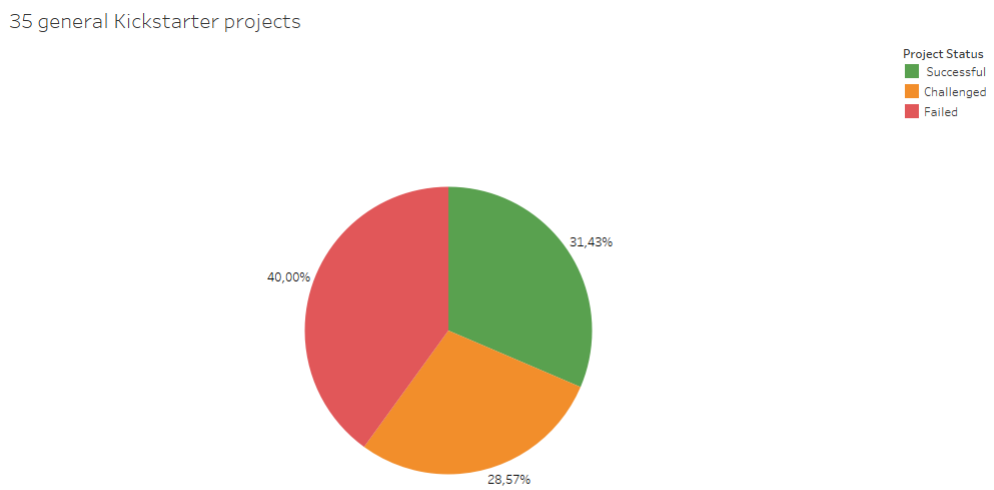

Figure 2.2: The success rate of the 35 general Kickstarter projects

undelivered projects being failures. For this specific data set, it has been assumed that on time delivery also meant that they were satisfactory. As seen in figure 2.2, Kickstarter projects in general seemed to have an almost even split in project statuses. However, the projects still leaned more towards failing with a failure rate of 40% and a challenged rate of 28,57%. With only 31,43% of the projects delivering successfully.

2.6 Judgment of delivered products

As was noted by the Chaos report(32), projects did not only fail by being late, but also by delivering a final product that did not deliver adequate value or meet customer expectations and thus being unsatisfactory. For videogames, this would be the case when a game offers a low quality gaming experience. Lin et al.(18) researched the reviews of videogames that released on the Steam PC platform and found that negative reviews contain more complaints about the design of a videogame rather than software bugs. With Steam being the biggest distribution platform for videogames on PC, the information in the reviews there can be assumed to be relevant. Additionally, Lin et al. also suggested that positive reviews should not be ignored for future studies, indicating that videogames with a high rating could be of value as examples for future videogame development projects. Reviews in the Steam review system are binary with a thumbs up or thumbs down, accompanied by

a written part where the reviewer can elaborate on the reasoning for their rating. Steam then takes all the reviews and a calculation is made by dividing all positive reviews by all posted reviews:

$$\frac{\#\text{ of recommended reviews}}{\#\text{ of all reviews}} \tag{2.1}$$

Which then results in a percentage that gets converted into a nominal collective user rating for a video game. However, Steam never openly shared what the exact percentages and numbers are for them to assign a certain percentage a certain rating. Doucet(5) poured through multiple Steam games using their search function, finding the results regarding the assignment of rating based on their positivity percentage as seen in table 2.1.

Table 2.1: Reviews as weighed by Steam

Steam review ratings	
95 - 99%	Overwhelmingly Positive
94 - 80%	Very Positive
80 - 99% + few reviews	Positive
70 - 79%	Mostly Positive
40 - 69%	Mixed
20? - 39%	Mostly Negative
0 - 39% + few review	Negative
0 - 19%	Very Negative
0 - 19% + many reviews	Overwhelmingly Negative

It seems there was an additional clause for "Positive", "Negative" and "Overwhelmingly Negative" rated videogames regarding the number of reviews they have gotten. Unfortunately, as Steam has never confirmed this, it was just an assumption.

3

Research strategies and research methods

3.1 Strategies and methods

To answer the subquestions and consequently the main research question, two research strategies were used. The strategy for the first subquestion consisted of a quantitative analysis of funded Kickstarter projects, taking a positivist approach to project data from Kickstarter. The strategy for the second subquestion took an interpretivist approach, looking at the same data but also sources associated to those Kickstarter projects to investigate them from a qualitative perspective.

3.1.1 Positivist data collection

This method was used for the positivist strategy, to collect data and construct a data set consisting of a 100 Kickstarter projects that got funded in 2017 and only contained data that was taken from Kickstarter projects their campaign pages. 2017 had been chosen as starting point due to the relative time between that year and the present (2022), giving those projects approximately five years to deliver a product. The 100 projects were chosen through systematic sampling, with the first 100 viable projects being taken into the data set.

Kickstarter itself did not provide a tool or adequate filtering to construct a data set directly. Data sets were provided by Web Robots(36), a company that does business in web scraping projects. The Kickstarter data sets could be found for free on their website, these data sets consisted of data that is publicly available on Kickstarter project pages themselves. Some of the data points were inaccurate, but were rectified after the

100 projects were chosen. The inaccuracies pertained mostly to data either missing or being incorrect. For example, a value being incorrectly documented as 1000,00 instead of 100000,00. Afterwards, each project in the data set was extended with data such as funding, backers, team size, risk text count, delivery delay if the project delivered and expected roadmap steps if there was a roadmap present.

3.1.2 Interpretive data collection

This method was used for the interpretive strategy, collecting data for the same 100 Kickstarter projects but based on observations and theories from prior research, in addition to containing information from other sources besides the campaign page of a Kickstarter project. The projects were evaluated based on factors such as the content of them being designed in 2D or 3D graphics, the project risk awareness and whether they were singleplayer or multiplayer.

The project awareness in this case was generalized into three categories and coded(20) into abbreviations. Additionally, sources such as social media, websites related to the projects or product pages on Steam and Itch.io were investigated to determine the project success status. This was the most difficult data to collect and was therefore not present on the original Kickstarter page and not in the Web Robots data set. Determining this data was the most important data collections step to create data sets that can be used for predicting project failure and analyzing failure rate.

Determining project delivery status

Each project was assigned a delivery status based on how many days it took for a project to deliver their product. The conception of this column for the data set was based on the Chaos report(32) OnTime attribute. However, the report did not specify how long after a project its intended release the delivery would be considered late. For this research, a project was still considered on time if they delivered their videogame within 6 months after their planned release date. Assuming the Standish Group International did not immediately consider a project too late if it delivered some time past its planned delivery date, 6 months was chosen similar to van Otterloo(35). Where a project that delivered within 6 months after its original planned, was considered to be on time. After this, the periods of 6 to 24 months and more than 2 years were chosen as periods of time after the initially planned release date. For this research, 6 to 24 months was chosen as a period in which time-wise a project would not immediately be labeled as a failure, but could be cause

for concern because something might be going wrong with the project. A delivery date of more than 2 years after the planned release was chosen for a project to be considered a failure in this research.

Determining project success status

Each project was assigned a success status based on its delivery status and Steam rating. Using the Chaos Report(32) Modern Resolution definition which consisted of a project being on budget, a project being on time and a project being satisfactory. For the part of being on budget and on time, only the delivery status was used. While the delivery status only states how long it took for a project to be delivered, it has been assumed for this research that if a project had been going on longer than the Kickstarter campaign had initially planned for, that is was no longer on budget. For a project being satisfactory, the Steam user rating was used. As reviewers on the Steam platform are the end-users of delivered videogames and as such are a valid source to deem a videogame as (un)satisfactory, in addition to a majority of projects in the data set being intended to release on PC. For this research, a game has also been deemed satisfactory if an aggregate score was not available due to there not being enough reviews or if the game did not release on the Steam platform.

3.1.3 Graphing and data models

After all the data was gathered, the statistical tool Tableau was used to process the data set into graphs. After which, the results were used as factors to answer the research questions. For the found factors, several measures were then described to mitigate them. Finally, two data models were created in the form of decision trees based on the results that came forth from the graphs.

Theories and hypothesis

The formulated theories were investigated through the use of data visualisation and comparison. The hypothesis stated was calculated through a one-tailed sample proportion test, using the following equation:

$$Z = \frac{p - p0}{\sqrt{\frac{p0(1-p0)}{n}}} \tag{3.1}$$

3.2 Data set construction

A data set which can be found in appendix A.1 has been constructed through the use of data sets provided by Web Robots(36) as the base. Afterwards, data was added through the methods as described by the previous subsections. To get to the final data set, there were several criteria and addition of data so the final data set would have information that could be relevant for the research. To give the Kickstarter projects a fair amount of time for the development of their videogames, it was opted to look at videogame Kickstarters that had been funded in 2017. Which would give those project an estimate of at least five years to deliver their projects, only Kickstarter projects from 2017 were retrieved from Web Robots. Afterwards, the data set was filtered to only contain funded projects within the category of "videogames".

Following that, the data set was adjusted to only contain projects that had a funding of at least $1000,-. To ensure that the final data set would contain projects that warranted longer development timelines. Within the "videogames" category of Kickstarter, not every project was an actual videogame. For this research, it was opted for the final data set to only have a 100 videogame Kickstarter projects to ensure there was enough time to check each project individually. Due to the relative small amount of funded videogame Kickstarter projects above a funding of $1000,- being around just 300 projects, this research opted to go alphabetically down the set until a 100 appropriate projects were found. After manual inspection, there were several projects that had to be removed:

- Development courses: Projects that were not actual videogames but were about teaching how to code to create videogames such as: Game Development Mini-Degree - Learn to Code and Make Games (A.2).
- Conferences: Projects that gathered funding for conferences or parties about videogames such as: AdventureX 2017: The Narrative Games Convention (A.2).
- Separate assets: Projects that consisted of only one asset for a bigger videogame project such as: The Contractors - Create Character 3D Model: Nyla (A.2).

After removing every project that was not an actual videogame, the 100 videogames to be taken into the final data set were set. Before each project in the data set was expanded with additional data columns, they had to be double-checked to ensure that the shown data was correct.

3.2.1 Data collected from Kickstarter campaign pages

The data for the set was collected through different methods. In this subsection, the collected data has been divided by the collection method to clarify how the data for each column was obtained.

Scraped columns

After assessing which columns retrieved from Web Robots were relevant for the research, the following columns consisting of data collected from the Kickstarter campaign pages were left after removing the ones that were redundant or irrelevant:

Table 3.1: Scraped columns

Column	Description
projectName	Name of a Kickstarter project, originally named "name".
link	Link to a Kickstarter their project page, originally named "urls".
launchedAt	Date on which a project started to gather funding, originally named "launched_at".
deadline	Funding deadline, originally named "deadline".
backersCount	The number of backers that a Kickstarter project had, originally named "backers_count".
fundingGoal	The funding goal for a Kickstarter project in their local currency, originally named "funding_goal.
currency	A Kickstarter project their local currency, originally named "currency".
pledged	The funding amount a Kickstarter project has received in their local currency, originally named "pledged".
staticUsdRate	Conversion rate of local currency to USD at the time of funding deadline, originally named "static_usd_rate".
usdPledged	The funding amount a Kickstarter project has received in USD, originally named "usd_pledged".
country	Country of origin of a Kickstarter project, originally named "country".

Some of the columns were edited, as they differ from their original gathered names. This was done as the underscores caused processing inefficiencies when using the data for calculations in statistical tools. The removal of underscores made the data set easier to use with statistical programs such as Tableau and Excel and could help with its future use if used in similar statistical programs where lack of spaces in variable names results in a more efficient workflow.

Manually input data

The following data was added manually directly from Kickstarter campaign pages to supplement the data that was scraped.

Table 3.2: Scraped columns

Column	Description
id	The index number for the data set.
plannedRelease	The planned release of a Kickstarter their project, taken directly from a Kickstarter their campaign page. If a project stated their planned release to be a in a certain month in a certain year but without specific day, the estimation has been set at the last day of that month. Example: June 2018 would be set as 30-06-2018, giving the project until the end of their planned month.
riskWords	The number of words a Kickstarter campaign used in their risks and challenges section.
riskSignal	A content qualification of the text in a Kickstarter campaign their risks and challenges section. • NR = "No Risks": The section was empty or no risks were mentioned at all. • ARNC = "Aware of Risks, No Countermeasures": Risks were mentioned but no countermeasures were noted in case those risks were to happen. • ARPC = "Aware of Risks and Possible Countermeasures": Risks were mentioned including countermeasures in case those risks were to happen.
riskSignalN	Numerical variable of riskSignal. • NR = 0 • ARNC = 1 • ARPC = 2
earlierKS	The number of Kickstarter projects that the team had worked on before.
plannedSteps	Number of steps a project had planned to take after the launch of their Kickstarter. Has to be communicated in a clear way such as a roadmap or table in which the steps/planning are countable.
Gameplay	Whether the Kickstarter campaign trailers contain gameplay footage.

Continued on next page

Table 3.2 – continued from previous page

Project	Description
stretchGoals	Number of stretch goals that a project had available.
stretchGoalsMet	Number of stretch goals that a project achieved.
stretchGoalsMetP	Percentage of stretch goals met if applicable, blank if not applicable.
statusUpdates	Number of project updates posted on the Kickstarter campaign page.
platforms	The platforms that a project wanted to release their videogame on. Only platforms that were within the original scope at the start of the project are taken into account for this column, not platforms that might be added later through stretch goals.
Platform availability	Whether the project intended to originally release their game on a single platform or multiple. • Single-platform: Only one platform was planned • Multiplatform: Multiple platforms were planned
languages	The number of languages that a project aimed to support. Only languages that were within the original scope at the start of the project are taken into account for this column, not languages that might have been added later through stretch goals or after release of the game.
notes_Optional	Additional notes about a project.

3.2.2 Collecting project success data

After the columns that contain information from the Kickstarter campaign pages were done. The following columns were added to be used for the determination of project success:

Table 3.3: Columns from multiple sources

Column	Description
deliveryCompleted	Date on which a project was delivered, taken from a Kickstarter updates, comments or by finding their product page through a hyperlink or Google search. If a project has not been delivered, the variable gets set as "Undelivered".

Continued on next page

Table 3.3 – continued from previous page

Project	Description
ProjectStatus	A project its status as of July 2022. • Abandoned: Project seems to have been abandoned with no communication in at least 6 months or project has a confirmed abandonment through an update by the developer. • Ongoing: Project is still ongoing with communication and updates, games released in an early access state also fall under this category as the project is still ongoing and did not release a finished product yet. • Released: Project released a full version 1.xx videogame product.
teamSize	The number of people working on a project, this number was either directly taken from the Kickstarter campaign page and otherwise from a project their own website. Cell has been put on "Unknown" if team size could not be found.
updates	Number of project updates posted on the Kickstarter campaign page.
steamRating	Aggregated review rating of delivered product that released on Steam. Only ratings of videogames that were available on PC and subsequently on the Steam platform were documented. If a game on Steam did not have enough reviews to create an aggregated rating, a game did not release on Steam or did not release at all, then the column has been set to "Unknown". • Overwhelmingly negative = 1 • Very negative = 2 • Negative = 3 • Mostly Negative = 4 • Mixed = 5 • Mostly positive = 6 • Positive = 7 • Very positive = 8 • Overwhelmingly positive = 9
purchaseLink	A link to the product page of delivered products.

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Table 3.3 – continued from previous page

Project	Description
type	The type of game regarding whether it supports one or multiple players. • Singleplayer game = 1 • Multiplayer game = 2
dimension	The graphical dimension of a Kickstarter project, interpreted by looking at renders and trailers of the videogame. • 2D = 1 • 3D = 2 • Audio-only = 3

3.2.3 Calculated data

After the data that had to be manually input, the final type of data that had to be constructed was the data that is based on the other columns by means of calculation. This was not just data that could not be retrieved from Kickstarter campaign pages and their associated sources, but also data that was needed to work on the formulated hypotheses:

Table 3.4: Calculated columns

Column	Description
plannedDuration	Number of days a project planned to take for development. Calculated based on the difference in days between plannedRelease and launchedAt.
delivered	Whether the project delivered. Calculation based on deliveryCompleted column. If deliveryCompleted is "Undelivered" this column is 0, otherwise 1. • No = 0 • Yes = 1
slippageD	The number of days between a project their planned release date and their actual release date. Calculated by taking the difference in days between plannedRelease and deliveryCompleted. However, if a project has a deliveryCompleted of "Undelivered", this variable gets set to 1500.

Continued on next page

Table 3.4 – continued from previous page

Project	Description
slippageP	The degree to which the project needed extra time to deliver relative to their planned duration in percentages. Calculated by dividing slippageD by plannedDuration and formatting it into percentages.
deliveryStatus	The delivery status of a project based on the number of days it took to deliver. • 2+ years delay: Projects with a slippageD of more than 720 days. • 6-24 month delay: Projects with a slippageD of more than 180 days but less than 720 days before being delivered. • On time: Projects that released before/on their estimatedRelease or only had a slippageD of less than 180 days. – Unsatisfactory: Projects that released before/on their estimatedRelease or only had a slippageD of less than 180 days but were given a review score of mixed or lower. • Undelivered: Project has not delivered, either abandoned or ongoing.
onTime	Whether a project delivered on time. Calculation based on deliveryStatus column. If deliveryStatus is "On time" this column is put to 1, otherwise 0.

Continued on next page

Table 3.4 – continued from previous page

Project	Description
successRate	The success rate of a project in regards to project management. • Failed: A project has been deemed a failure if one of the following occurred: – The project had been abandoned, deeming it an immediate failure. – The project had a delivery delay of more than 2 years, deeming it a failure in regards to project management, even if the end product has been rated satisfactory. – The project had a steamRating of "Mixed" or worse, deeming it a failure as the end-users were not satisfied with the output of the project. • Challenged: A project has been deemed to be in a challenging position if one of the following occurred: – The project is still ongoing but has a delay between 6 - 24 months and no Steam rating. – The project has their videogame in Early Access but has a delay between 6 - 24 months and has a positive or no Steam rating. – The project released their videogame but had a delay of 6 = 24 months and has a positive or no Steam rating. • Successful: A project has been deemed successful if they released their videogame on time and the product was satisfactory with a Steam rating of "Mostly positive" or higher. Alternatively, it is still deemed a success if there was no rating available while being released on time.
successN	Numerical variable of succesRate. • Failed = 0 • Challenged = 1 • Successful = 2
funding	The degree to which a project was funded in percentages.

4

Results

4.1 Data set analysis

After constructing the data set, the 100 videogame projects were analyzed to gain the needed insights.

4.1.1 Success rate results

From the 100 projects, only 25 of them managed to conclude their project in a satisfactory and timely manner as seen in figure 4.1. While 47 of the projects failed, leaving 29 in a challenging state.

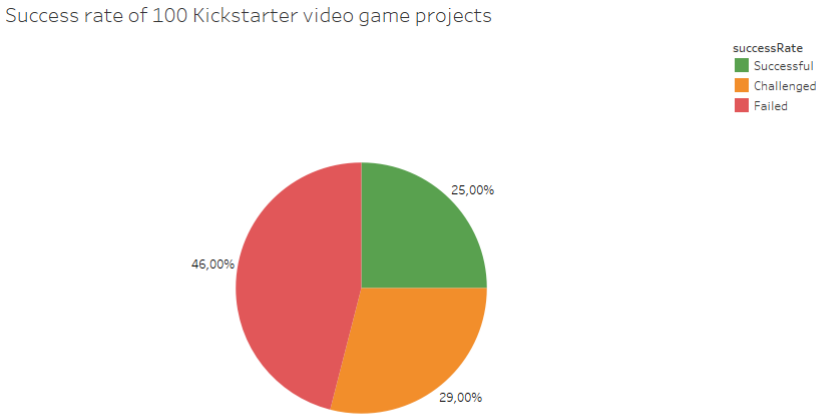

Figure 4.1: The success rate of the 100 Kickstarter videogame projects that got funded in 2017

When looking at projects that did release, 29 of them were released on time as seen in figure 4.2, with 4 of them being unsatisfactory. While 33 projects released within a time span of 6 to 24 months after their initially planned release date, leaving 8 projects that did release but after a delay of 2 years or more. In total, 70 of the 100 projects did release, even if it did take much longer than expected for some of them. With 42% of the released projects being on time, this aligns with the Chaos Report statistic as seen in section 2.5 in which also 40% of the projects were delivered on time.

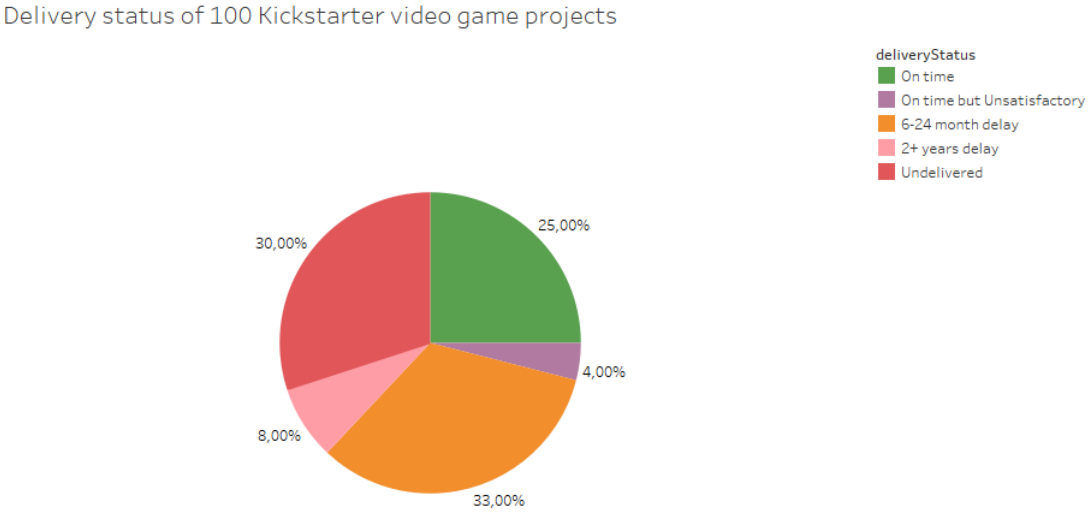

Figure 4.2: The delivery rate of the 100 Kickstarter videogame projects that got funded in 2017

However, as of 2022, 30 projects from the data set did not release a product as also seen in figure 4.2. 13 of those projects were abandoned, which means that only 17 projects still might deliver a project even though they would be regarded as a failure in this research due to the amount of time it has already taken them to work on their project. With the failed projects in mind, the on time metric lowers to 29%. Which is further removed from the Chaos database 40% onTime statistic, making it seem like videogame Kickstarter projects might be worse off compared to the projects in the Chaos database based on the analyzed sample.

Sample proportion success rate

The statistical hypothesis that pertained to the overall failure percentage of the data set was stated as follows:

- IT projects have a failure rate above 30%, regardless of domain, type, size or project management method

It turned out that 46% of the projects ended up failing regardless of domain, type, size or project management method in this data set its case. Which is more than the percentage reported by the Chaos report as seen in section 2.5 and significantly higher than the 9% reported by Mollick in section 2.1. However, to see how representative this was for a greater population of projects. A one-tailed proportion z-test was used to test the hypothesis.

$$Z = \frac{0.46 - 0.30}{\sqrt{\frac{0.30(1-0.30)}{100}}} = 3.49 \tag{4.1}$$

With a confidence interval of 5%, the Z-score has to be lower than -1.65 or higher than 1.65 to be considered significant, the Z-score of 3.49 was sufficient enough to reject the null-hypothesis that the failure rate is lower than 30%. Consequently noting that Mollick his notion of a 9% failure rate can be rejected as that is too low.

4.2 Theory results

This section shows factors with which different degrees of delivery statuses were found depending on the variable, these were factors that should be seen on a project their campaign page. Either when a Kickstarter campaign is new or almost near the end of its funding campaign. In this case, they pertained to the percentage of funding a campaign had gotten, the funding goal of the campaign, the graphics of the game, whether there was a roadmap present and team composition.

4.2.1 Funding

The first two theories pertained to the degree of funding affecting the delivery time of a project:

- Overfunded Kickstarter projects will have a higher chance of successful delivery

- Barely funded Kickstarter projects will have a lower chance of successful delivery

To decide which projects were barely funded, the 25 least funded projects were chosen. The most funded project of the least funded had a funding of 113%, consequently, projects with a funding of 113% or less were considered barely funded as they did get funded but not too far beyond their goal. Projects with a funding of 114% or more were considered funded with several degrees of overfunding as can be seen in figure 4.3. Only 14,81% of projects that got barely funded were on time, with some of them also being unsatisfactory. Showing that for this data sample, it could benefit projects to be more considerate when planning out their project budgets. As mentioned in section 2.2, unrealistic budgets and insufficient resources were common project risks. With this in mind, the struggling projects that were barely funded could also be considered poorly budgeted as a more clear definition.

Figure 4.3 also shows that projects with a funding of 114%-200% had twice as many be on time compared to the ones that barely got funded. However, what stood out the most is that projects that gathered more than 500% had the most projects that were on time, with more than half being on time with some of them being unsatisfactory.

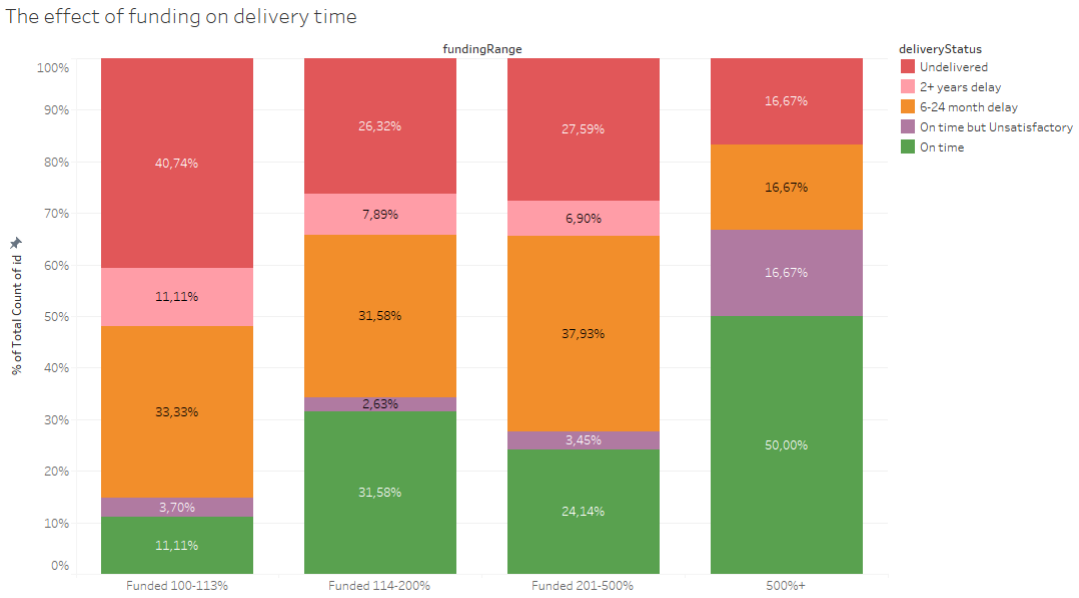

Figure 4.3: Funding and delivery status

The next theory was regarding the funding goal of the project influencing the delivery rate:

- Projects with high funding goals will have a higher chance of successful delivery

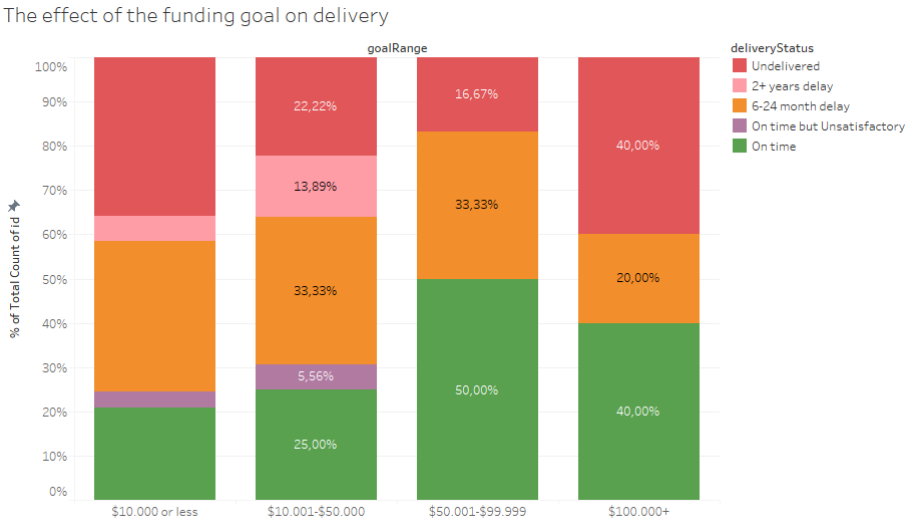

Figure 4.4: Funding goal and delivery status

Figure 4.4 shows that projects with funding goals above $50.000,- were more on time than the ones below that goal. Possibly indicating that projects with high funding goals in this sample were more realistic with the funding they would need. A possible explanation could be that projects below a funding goal of $50.000,- ran out of money faster which resulted in the projects delaying.

Occurred issues associated to funding

After the above insights, some projects were also found to be reporting explicit issues related to funding, table 4.1 lists these projects with summarized explanations about what happened according to the project creators. These issues align with what figures 4.3 and 4.4 had shown, as most of the specified projects here had a funding goal of $10.000,- or less and only one project had a funding percentage of 201-500%.

Table 4.1: Explicit found issues that were related to funding

Issues related to funding		
Project	Explanation	Related data points
K005	A lot of money was spent on promoting someone their artwork, project creator was considering doing another crowdfunding campaign as explained here.	Funded 114-200% Funding goal of $10.000,- or less
K014	The project team underestimated the work that would have to go into creating the needed technology and tried to find a way to get more funding as explained here.	Funded 114-200% Funding goal of $100.000+
K016	The developer set up a Patreon page as the initial funding from the Kickstarter campaign was not enough, the Patreon page can be visited through this link.	Funded 114-200% Funding goal of $10.000,- or less
K030	The project ran out of money quickly and the team had to take on clients to get money to keep the project funded as explained here.	Funded 100-113% Funding goal of $10.000,- or less
K045	The project had to set up a Patreon page to keep the project funded as the initial Kickstarter funding was not enough, the Patreon page can be visited through this link.	Funded 100-113% Funding goal of $10.000,- or less
K085	The project ran over budget and the project creator had to save money to ship the physical rewards out as explained here.	Funded 201-500% Funding goal of $10.000,- or less
K090	The project ran out of money and tried to get extra money by releasing a similar looking game with a different name as explained in a comment by a backer that managed to contact the project creator.	Funded 114-200% Funding goal of $10.000,- or less
K100	The project depleted the money from the Kickstarter funding as it took longer than expected, explained here by a backer that managed to contact the project creator.	Funded 100-113% Funding goal of $10.001-$50.000

4.2.2 2D and 3D games

One of the theories was specifically related to an aspect of videogame development, whether the game had 2D or 3D graphics:

- 3D videogame projects will have a higher degree of slippage compared to 2D videogame projects

While the on time rate between 2D and 3D game only differs by an approximate of 9%, there is a significant degree in whether they did deliver at all as shown in figure 4.5. With 74,65% of all 2D games delivering, even if it was late or ended up being an unsatisfactory

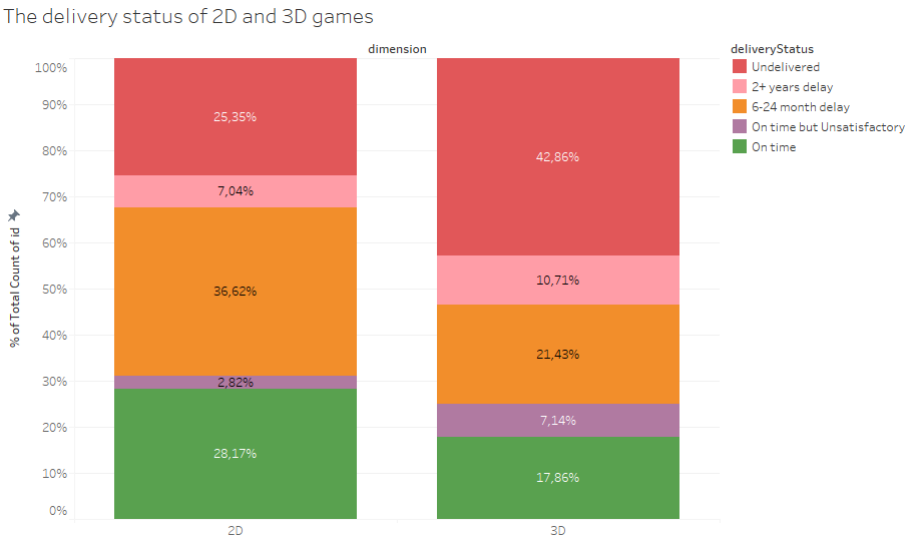

Figure 4.5: Dimension and delivery status

experience. Whereas in the case of 3D games, almost half of them did not deliver at all with an undelivered rate of 42,86%.

4.2.3 Roadmap or no roadmap

Figure 4.6 also shows that in cases where a roadmap was present, 50% of the projects delivered on time. Which aligns with the following theory:

- Projects divided up in smaller steps are more likely to deliver on time

However, only six of the 100 projects had a roadmap present. Which means that on this factor, only three projects succeeded to be on time. With this low of a proportion, it cannot be immediately assumed that the presence of a roadmap improves delivery chances. It does imply that more projects should have had a roadmap as six out of a 100 is very low, especially with only three of the six being on time.

4.2.4 Team size and experience

The last theories in which there were significant differences between delivery rates were the following two:

- Inexperienced teams are more likely to delay
- Projects are more likely to deliver on time with bigger teams

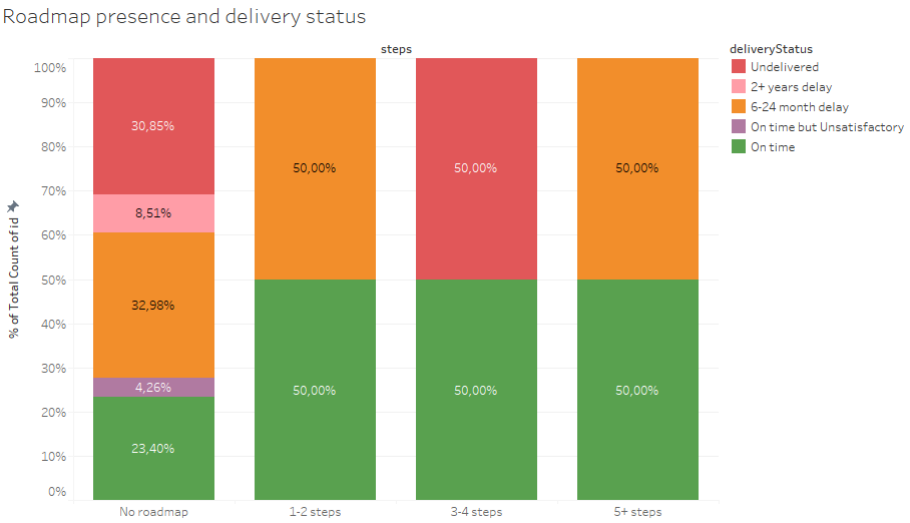

Figure 4.6: Roadmap and delivery status

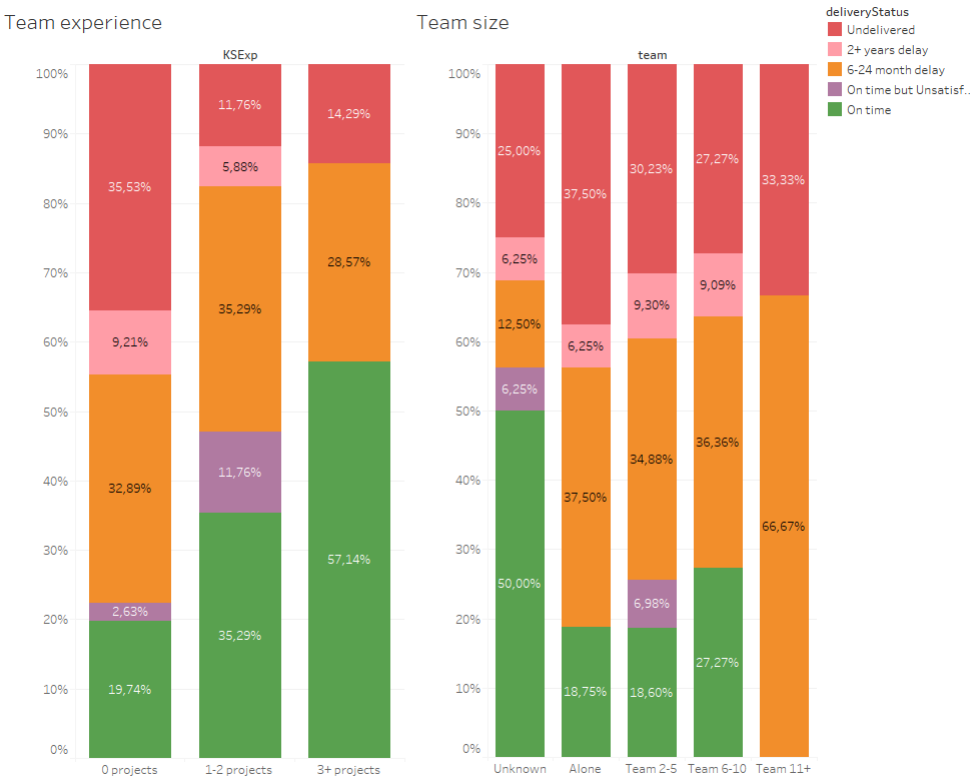

Figure 4.7: Team and delivery status

Projects with teams that had done 3 or more prior Kickstarter projects, delivered on time to a significant degree compared to teams that had no experience or only 1 or 2 prior Kickstarter projects as seen in figure 4.7. In regards to the size of the teams, 50% of projects with an unknown team size delivered on time. Projects with just one person doing everything had the most failures, possibly due to the lack of opportunity to divide work among multiple people. In addition to teams having the possibility of specialized knowledge being dispersed among a team, as opposed to one person who is likely to not be as evenly skilled in every facet of software and/or game development, causing the project to delay. From this data set, the most optimal team size was between 6 to 10 team members. As smaller teams were a bit less successful being on time, and bigger teams had no projects that were on time.

Occurred issues related to the team size and experience

After the above insights, some projects were also found to be reporting explicit issues related to lack of experience and team size. table 4.2 shows three projects where lack of experience proved to be an issue for the progress of the project. Aligning with figure 4.7 as all three of the projects in the table were headed by teams with no experience and just one developer. Only project K036 admitted that being an amateur and developing on their own was an issue, it could be inferred that projects K009 and K013 might have had better progress if their lack of experience was complemented by other team members with experience or also without experience but a spread out workload.

Table 4.2: Explicit found issues that were related to team experience and/or size

Issues related to team composition		
Project	Explanation	Related data points
K009	The project creator had to hand over the project to someone else, as they explained in this status update that the development for their game is hard work and they were not up to it.	0 earlier Kickstarters Developing alone
K013	The sole developer described how they only started coding for the first time around 2 years before the campaign started. Additionally, there was a period of more than a year in which the developer did not code, resulting in unfortunate output when they started coding again as they explained here.	0 earlier Kickstarters Developing alone

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Table 4.2 – continued from previous page

Issues related to team composition		
Project	Explanation	Related data points
K036	The project got abandoned, the project creator admitted that the project as it was pitched initially was too ambitious for an amateur solo developer and got burned out over time. Refunds were offered through contacting the developer as this status update shows.	0 earlier Kickstarters Developing alone

4.3 Theories that were not discussed

Theories that were formulated but were not discussed in this section due to insignificant differences can be found in appendix B. Table 4.3 lists all the theories and whether they were addressed.

Table 4.3: Theory status

Theory	Status
Overfunded Kickstarter projects will have a higher chance of successful delivery	Discussed in section 4.2
Barely funded Kickstarter projects will have a lower chance of successful delivery	Discussed in section 4.2
Projects with high funding goals will have a higher chance of successful delivery	Discussed in section 4.2
Crowdfunded videogame projects without gameplay footage in campaign trailer will have a higher degree of slippage	Graph B.2 can be found in appendix B as differences were not significant enough to discuss
Multiplatform videogame projects will have a higher degree of slippage compared to single platform videogame projects	Graph B.2 can be found in appendix B as differences were not significant enough to discuss
3D videogame projects will have a higher degree of slippage compared to 2D videogame projects	Discussed in section 4.2
Inexperienced teams are more likely to delay	Discussed in section 4.2
Projects aware of possible risks are more likely to deliver on time	Graph B.3 can be found in appendix B as differences were not significant enough to discuss

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Table 4.3 – continued from previous page

Theory	Status
Projects that include online capabilities will have a higher degree of slippage	Discussed in section 4.2
Projects divided up in smaller steps are more likely to deliver on time	Discussed in section 4.2
Projects are more likely to deliver on time with bigger teams	Discussed in section 4.2

5

Conclusion

This section contains conclusions based on the findings in section 4. First, the success rates from this research will be compared briefly to the van Otterloo and CHAOS success rates. Afterwards, the research questions will be answered.

5.1 Kickstarter projects in general and video game Kickstarter projects

When comparing the results of this research to the success rates of the van Otterloo data set in figure 2.2 and the IT projects in the CHAOS database in figure 2.1 from section 2.5, general Kickstarter projects fare a bit better than specifically videogame Kickstarter projects. Figure 4.1 has shown that only 25% of videogame Kickstarter projects managed to deliver successfully, which is a bit lower than the general Kickstarter projects from van Otterloo. Making crowdfunded videogame projects seem a bit more risky compared to backing other projects, at least on Kickstarter. Similarly, the success rate of videogame Kickstarter projects is also a bit lower than the IT projects from the CHAOS database, indicating that videogame development projects might also be a bit more risky compared to other IT projects in general.

5.2 What is the failure rate of crowdfunded video games to deliver on time and what are the reasons?

5.2.1 What is, based on a representative sample, the estimated failure rate of Kickstarter-funded videogame projects?

As seen in section 4.1, 46 of 100 projects were failures. Either due to abandonment, a delay of more than 2 years or not being satisfactory as a videogame. In cases of abandoned projects, a majority of those projects did not explain why the project had stopped. Only 2 of the 13 abandoned projects had posted updates in which they clarified why they were going to stop the project, with project K020 explaining that they could not manage a business and videogame development. Project K036 admitted that their pitched project was too ambitious for them, causing a burnout. There was also project K054, where the game did release in october 2018 but was seemingly deleted in or before september 2021 according to SteamDB, a website that tracks changes on Steam game entries. Thus the game was rendered abandoned as it was removed with no explanation from the developer.

While there were no explicit cases of projects that were fraudulent, project K090, a game named "HERCULES - The Untold Stories" had suddenly stopped posting status updates in October 2018. However, a week after their last status update a game called "YOU - The Untold Stories" released on Steam: `https://store.steampowered.com/app/904930/YOU__The_Untold_Stories/`. While there was no clarification from the developers themselves, a backer in the Kickstarter comments contacted the project creator and had found that the release of that similar looking game was an attempt at a so called cash injection, because the project ran out of funding. However, that did not work as the project did not get any updates anymore after october 2018.

5.2.2 What are the key factors that lead to the failure of a Kickstarter videogame project?

There were several factors that could be observed:

- Projects were not funded appropriately, with projects that barely got funded only having an on time rate of 14,81%, with some of those projects being unsatisfactory. As also explained in section 4.2.1, it is possible that they were not just barely funded. But poorly budgeted as that has a clearer definition. Projects only went over the CHAOS Report 40% onTime in cases where the funding was more than five times the original goal. Similarly, projects that asked for $50.000,- or more had a higher

rate of delivery than those below that funding goal, possibly indicating that some projects might have stated too low of a budget.

- 3D projects were less likely to deliver at all, possibly due to the increased complexity compared to 2D games. As developing in 3D requires physics, animation and modelling in a more advanced and complex manner compared to 2D. For this data set, 2D games posed a lower risk to expect a delivery at all.
- Lack of project roadmaps, projects that lacked a roadmap had a lower rate of being on time compared to the ones that did have a roadmap. However, it should be noted that only six out of a 100 projects even had roadmaps present.
- Lack of experience and staff, projects that lacked experience with Kickstarter projects had a lower rate of on time delivery, especially if they were alone.

6

Advice & Discussion

This section contains recommendations for both Kickstarter project creators and potential backers. In addition to these recommendations, both parties can consult the data set itself which can be found in appendix A.1.

6.1 Advice for Kickstarter creators

6.1.1 Measures against potential risks

Based on the results of the research, the measures stated in the following subsection should be applied to crowdfunded projects to mitigate the found possible risks. Not just for videogames, but also for crowdfunded projects that want to develop software in general.

Delay, project complexity and funding

As only 25% of the projects in the data set managed to successfully deliver their projects on time, most of the projects were delivered too late for various reasons.

For a more generalized advice, NEN(24) proposes that developers create prototypes in case there are uncertainties about the feasibility of the project. For videogames this can be done in the form of a demo, a vertical slice that showcases the core functionalities of a videogame and possibly story segments. After assessing how long it takes to get the functionality working for the demo segment of their videogame, the project creators should estimate how long it would take to get that same functionality working if they scale that effort up to a full videogame.

Afterwards, the project creators should document a roadmap that outlines their steps for the project. So they have a clear overview of what needs to be done and how much effort, time and resources each step takes.

After the project creators know the effort and resources that will have to go into the project, they can make a budget for their project based on the previous steps to avoid budgeting poorly. As this might prove especially difficult for inexperienced creators, Kickstarter provides a budget calculator(13). Kickstarter explains that this tool provides creators with a way to get a clearer understanding of what a budget might entail. Expenses that might not have been considered for example, such as the costs of hiring extra help and purchasing equipment.

Lack of sta and expertise

To mitigate the risk of lacking expertise on a development team, it is important to identify who is part of it and what they can do. In conjunction, it is important to know what the functional and non-functional requirements for the project are. As knowing those requirements would also inform the team of which expertise they might be lacking for the requirements to be fulfilled. In game development for example, it would be important to know who can do 3D-modeling, coding artificial intelligence, writing dialogue and other separate elements that composition into a videogame.

In the three cases where a lone developer delivered their project successfully, they either created simple platforming games with pixel graphics as were the cases with projects K032 and K064 or used relatively easy to use software such as RPG Maker as was the case for project K024. That does not mean that lone developers should restrict themselves to simple videogames and pixel graphics only or just use RPG Maker, but that they should be aware of their own skill set and available resources.

Every developer can get access to tools and sources that can help with development processes. Widely used engines such as Unreal Engine and Unity have documentation and Github support available for developers. However, if a project creator that has outlined their budget, needed work and available expertise finds that the team is missing some important skill sets. It should be considered to find additional staff that can fulfill the needs of the team, especially if a project creator is working on their own and needs to do everything themselves. A project that is only worked on by one person would have to reassess whether it is still feasible, especially if they lack experience. If their budget permits, they could consider hiring an experienced freelancer to help them with their project.

An additional resource that inexperienced videogame developers can use are the reviews on the Steam platform. As explained in section 2.6, negative reviews were found to contain more complaints about the design of a videogame rather than software bugs. Developers should look into the negative reviews of videogames within the same genre they are creating

and take note of game design decisions to avoid or be considerate about, especially if they lack prior experience in videogame development.

6.2 Advice for potential backers

As it is difficult to assess whether a project will end up delivering when it is funded, a data model in the form of a decision tree has been created based on the data set that was made for this research. The choices in the decision tree are based on factors that should be visible on a Kickstarter their project page before the funding period ends as can be seen in figure 6.1, potential backers can use it as tool to decide whether they want to financially back a crowdfunded videogame project on Kickstarter or other crowdfunding platforms. The decision tree is based on the results in section 4.2 and contains decisions that should primarily guide a potential backer to projects that have a higher chance of being successful. As the choices are made in the tree and the proportion of failures decreases, the amount

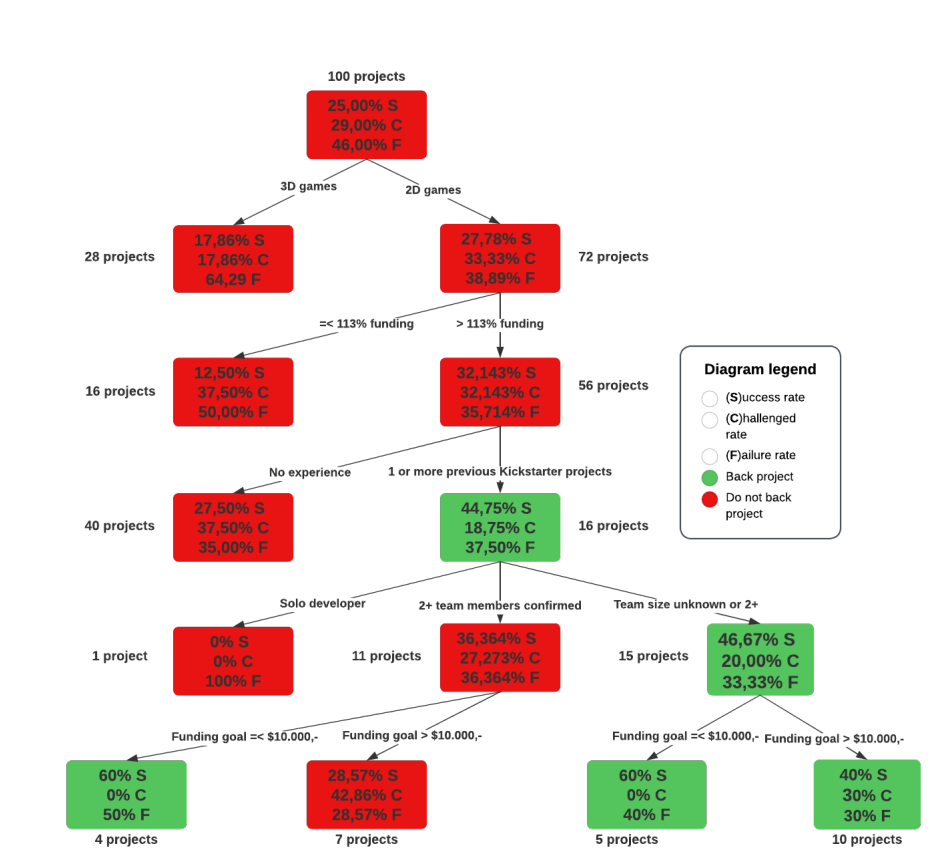

Figure 6.1: Decision tree to support potential backers

of projects also decreases. The most optimal path for the lowest proportion of failure and as many possible projects in this case would be to go for 2d games with more than 113% funding lead by a team that had at least one previous Kickstarter project with an unknown team size or two or more confirmed team members with a funding goal of more than $10.000,-, which ends at ten projects with a 40% proportion of successful projects. Which is a significant improvement over the initial success rate of just 25%, especially since the rate of failure has also dropped.

Another perspective that could be taken by a potential backer is that they do not mind a project being a bit later as long as they are not failures. With that perspective in mind, a second decision tree has been created to guide a potential backer towards a decision where the rate of successful and challenged projects is significantly higher than the failure rate as can be seen in figure 6.2. This decision tree only contains decisions based on funding

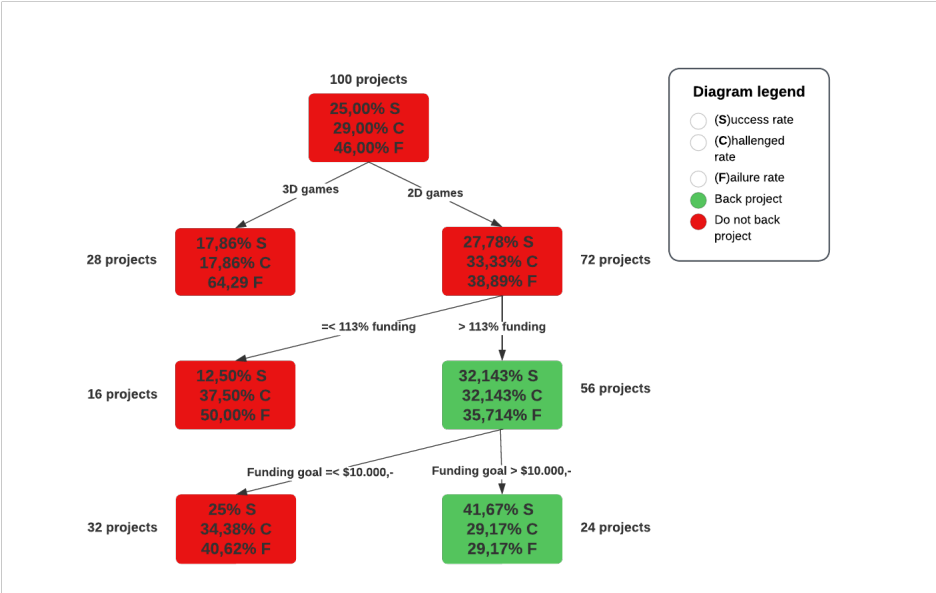

Figure 6.2: Decision tree to support potential backers

and the funding goal, consequently being smaller than figure 6.1. The most optimal path for the potential backer would be to back a 2D game that has more than 113% funding and a goal of more than $10.000,-. The rate of failure lowers down to 29,17%. The rate of challenged projects is also at 29,17% but when added together with the success rate of 41,67%, the non-failure rate ends up at 70,84% with 24 projects. With figure 6.2 being less critical than 6.1, a potential backer would have more choices while still having a lower

failure rate than initially at a 100 projects, even if some of them end up in a challenging state.

6.3 Advice for other parties

Due to the findings of the research, this section was added to give advice to Kickstarter and other crowdfunding platforms in addition to parties like the NPR that publish theory to aid in project management.

Kickstarter and other crowdfunding platforms

Due to the lack of roadmaps during the research with only six projects having a roadmap present, an advice towards Kickstarter and other crowdfunded platforms would be to start requiring project creators to present a project timeline in the form on a roadmap on their campaign page. This would not just improve the transparency of the project, but would also make the project creators have to plan ahead accordingly due to the requirement. For example, an inexperienced solo developer might not think about a project timeline. But if a crowdfunding platform requires that they state which steps they plan to take, what those steps are and how long each step might take, that inexperienced solo developer might start reconsidering their initial delivery expectations and start readjusting accordingly and hopefully more realistically.

To help project creators be more realistic about their project timeline and feasibility during the process of the crowdfunding campaign creation, it would be helpful if Kickstarter and other crowdfunding platforms show a list of important elements to take note of when leading a project depending on the category chosen. When the videogames category is chosen by a project creator for example, crowdfunding platforms could highlight which skill sets are important to have on the project team and the associated costs to take note of in game development. Some project creators might not be informed of certain aspects that go into the project they want to crowdfund, highlighting those aspects could help those creators to re-evaluate their project plans if it seems that they forgot or did not know about them.

NPR and other similar agencies

While the NPR(24) document does take non-functional requirements into account, a section could be added that pertains to what the impact of a non-functional requirement might have on a project timeline and what should be considered for such decisions. In the case

of videogames, the graphical style of a videogame is a non-functional requirement but can have a large impact on the project delivery as seen in figure 4.5 due to the increased complexity of 3D digital assets compared to 2D assets. Not just the art modelling, but also the physics and animation work that would get more complex when developing a game with three-dimensional visuals instead of just two-dimensional visuals. This would then extend to whether the project team is composed of a multidisciplinary team that would be able to successfully deliver a project that got significantly more complex due to a non-functional requirement instead of a functional requirement.

6.4 Limitations and future

This research was conducted using a 100 Kickstarter projects about videogames from 2017, this was the amount determined to be within reason for a certain timeframe as multiple columns had to be input manually. Possibly limiting the accuracy of the statistical outputs, theories and hypothesis. Another limitation was the lack of literature on videogame development specifically, as there are additional facets to it compared to general software development. In some cases it was also difficult to collect data about some Kickstarter projects, as some were not as known as others, which resulted in Kickstarter comment sections being near-empty or lacking information besides congratulations on the project getting funded.

Another aspect of inaccessibility to information was that some status updates were only viewable by backers of the project, rendering them inaccessible at the point in time of this research as the funding period was over. In the future, a similar research should try to contact backers of the project to see if they are willing to share the locked status updates. That way, more information can be gathered. Another option is to contact the project creators themselves, but that might be difficult in cases where the projects failed as creators of the failed projects often closed down the associated social media channels and websites.

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Appendix A

Tables

A.1 Data set projects

The full data set can be found at: https://ictinstitute.nl/kickstarter-succes-video-game-dataset/

Table A.1: Videogame projects from the data set

id	projectName	projectStatus	deliveryStatus	successRate
K001	A Clockwork Ley-Line - A Visual Novel Trilogy	Ongoing	Undelivered	Failed
K002	A Grand Entrance for Visual Novel Grisaia: Phantom Trigger	Released	On time	Successful
K003	A Hero's Call - An Accessible Fantasy RPG	Released	6-24 month delay	Challenged
K004	A Matter of Time Kickstarter	Released	6-24 month delay	Challenged
K005	A Very Important Date + Spin-Off BL - Otome/Visual Novels	Ongoing	Undelivered	Failed
K006	A Wonderful Welcome for Visual Novel Wonderful Everyday	Released	On time	Successful
K007	â˜†â—†â—‡Sakura Tempest â—‡â—†â˜† Yaoi, BL Visual Novel Game	Ongoing	Undelivered	Failed
K008	Aaero - The Rhythm-Rail-Shooter	Released	On time	Successful

Continued on next page

Table A.1 – continued from previous page

id	projectName	projectStatus	deliveryStatus	successRate
K009	AIdol: Artificial Intelligence Idol - A Visual Novel	Released	6-24 month delay	Challenged
K010	Alcyone: The Last City â€" interactive fiction video game	Ongoing	Undelivered	Failed
K011	Alexa's Wild Night - Adult Visual Novel	Released	On time	Successful
K012	All Walls Must Fall: A Tech-Noir Tactics Game	Released	Unsatisfactory	Failed
K013	Ama's Lullaby - A point-and-click game in a cyberpunk world	Abandoned	Undelivered	Failed
K014	Ancient Cities	Ongoing	Undelivered	Failed
K015	Anew: The Distant Light	Ongoing	Undelivered	Failed
K016	Arbiter	Ongoing	Undelivered	Failed
K017	ARCANA HEART 3 LOVE MAX SIX STARS!!!!!! | 2D fighting game	Released	On time	Successful
K018	Archipelago: A Pirate's Tale	Released	6-24 month delay	Failed
K019	Artificer - The science of magic	Released	2+ years delay	Failed
K020	Ascend	Abandoned	Undelivered	Failed
K021	Ascendant Hearts - Visual Novel	Released	On time	Successful
K022	Ash of Gods	Released	6-24 month delay	Challenged
K023	Ashes of Creation New MMORPG by Intrepid Studios	Ongoing	Undelivered	Failed
K024	Astoria: The Holders of Power Saga RPG	Released	On time	Successful
K025	Astrobase Command - 70's Space Station Builder & Crew Sim	Abandoned	Undelivered	Failed
K026	ATOM RPG	Released	On time	Successful
K027	AzTech Games: Better and Bilingual Math Adventure Games	Released	On time	Successful
K028	Banner Saga 3	Released	On time	Successful
K029	Battle Princess Madelyn	Released	6-24 month delay	Failed
K030	Beacon The Awakening	Abandoned	Undelivered	Failed

Continued on next page

Table A.1 – continued from previous page

id	projectName	projectStatus	deliveryStatus	successRate
K031	BEAUTIFUL DESOLATION - Isometric Post-apocalyptic Adventure	Released	On time	Successful
K032	Bebop and Tempo	Released	On time	Successful
K033	Blasphemous: Dark and brutal 2D non linear platformer	Released	6-24 month delay	Challenged
K034	Bokube	Ongoing	Undelivered	Failed
K035	Brief Battles	Released	6-24 month delay	Challenged
K036	Cape Luna: A Beach Town RPG	Abandoned	Undelivered	Failed
K037	Carrot Cafe! | Visual Novel | Dating Sim	Abandoned	Undelivered	Failed
K038	Cattails | Open-world Cat & Wildlife Simulation Game	Released	On time	Successful
K039	Caveman Warriors - Multiplayer Platformer Arcade Game	Released	Unsatisfactory	Failed
K040	Celestian Tales: Realms Beyond	Released	Unsatisfactory	Failed
K041	CHANGE - A Homeless Survival Game	Released	2+ years delay	Failed
K042	Changeling - GxB Mystery/Romance Visual Novel	Released	6-24 month delay	Challenged
K043	Chasing the Stars, a BL Yaoi Visual Novel	Released	6-24 month delay	Failed
K044	Cheap Golf	Released	On time	Successful
K045	Chemically Bonded - Visual Novel	Released	6-24 month delay	Challenged
K046	Chuusotsu - 1st Graduation - A Visual Novel with Philosophy	Released	On time	Successful
K047	Crescent Loom: weave neurons, stitch muscles, create life.	Ongoing	Undelivered	Failed
K048	Crystal Chameleon Visual Novel	Released	On time	Successful
K049	Crystalline - Visual Novel Game	Released	6-24 month delay	Challenged
K050	CULTIST SIMULATOR: BEHOLD OUR END	Released	On time	Successful

Continued on next page

Table A.1 – continued from previous page

id	projectName	projectStatus	deliveryStatus	successRate
K051	Dark Devotion: A gloomy indie Roguelike - RPG	Released	6-24 month delay	Challenged
K052	Dead Matter	Ongoing	Undelivered	Failed
K053	Desert Child - A Hoverbike Racing RPG	Released	6-24 month delay	Challenged
K054	Design Hero	Abandoned	Undelivered	Failed
K055	Die for Valhalla! - beat 'em up arcade adventure	Released	6-24 month delay	Failed
K056	Doomtrooper - Digital Collectible Card Game	Ongoing	Undelivered	Failed
K057	Eagle Island	Released	6-24 month delay	Challenged
K058	Eat All The Things	Released	6-24 month delay	Challenged
K059	Edge of Atlantis - VR Fantasy Roguelike Action RPG Game	Abandoned	Undelivered	Failed
K060	Empire Deluxe Combined Edition	Released	6-24 month delay	Challenged
K061	Epic Digital Card Game	Released	On time	Successful
K062	Episicava Vol. 1 - A Visual Novel Action/Adventure Epic	Released	6-24 month delay	Challenged
K063	Epitasis	Released	6-24 month delay	Challenged
K064	Eskimo Bob for the NES	Released	On time	Successful
K065	Eternal Hour	Ongoing	Undelivered	Failed
K066	Evolution - The Video Game	Released	6-24 month delay	Challenged
K067	EXO ONE	Released	2+ years delay	Failed
K068	Exorcise The Demons â€" Dark Fantasy cooperation game	Released	2+ years delay	Failed
K069	Fatal Twelve â€“ The Thrilling Mystery Visual Novel	Released	On time	Successful
K070	Faulty Apprentice: Interactive Visual Novel / Dating Sim	Released	6-24 month delay	Challenged
K071	Fell Seal: Arbiter's Mark - Classic Turn-based Tactical JRPG	Released	6-24 month delay	Challenged

Continued on next page

Table A.1 – continued from previous page

id	projectName	projectStatus	deliveryStatus	successRate
K072	Feudal Feud - A Diplomacy MMO	Abandoned	Undelivered	Failed
K073	FIGHT KNIGHT	Released	2+ years delay	Failed
K074	Flynn: Son of Crimson | Fast paced 2D action platformer	Released	2+ years delay	Failed
K075	Forest Fortress: Live2D animated visual novel	Released	On time	Successful
K076	Forsaken Castle	Ongoing	Undelivered	Failed
K077	Fort Triumph - Tactical RPG	Released	6-24 month delay	Challenged
K078	Fossil Hunters	Released	On time	Successful
K079	Full Quiet - A New Adventure Game for the NES & PC	Ongoing	Undelivered	Failed
K080	Full Service â˜† BL/Yaoi/Gay Game â˜† Dating Sim â˜† Visual Novel	Released	2+ years delay	Failed
K081	Galaxy Crash	Released	6-24 month delay	Challenged
K082	Girls Make Games Presents: Find Me	Released	6-24 month delay	Challenged
K083	Global Adventures - An Action Packed PC MMO	Released	Unsatisfactory	Failed
K084	Gold Rush: The Game	Ongoing	On time	Successful
K085	Guard Duty - Point and Click through Time and Space	Released	6-24 month delay	Challenged
K086	Hackerman: A Competitive Typing Game	Abandoned	Undelivered	Failed
K087	Heartbound	Ongoing	Undelivered	Failed
K088	Hell Let Loose	Released	6-24 month delay	Challenged
K089	Hellpoint - A Dark Sci Fi RPG	Released	2+ years delay	Failed
K090	HERCULES - The Untold Stories	Abandoned	Undelivered	Failed
K091	Hex Gambit: Fast & fluid turn-based strategy	Abandoned	Undelivered	Failed
K092	Hollo Buster - A Pacapillar Videogame	Abandoned	Undelivered	Failed
K093	Hoverloop	Abandoned	Undelivered	Failed
K094	Hunter	Released	6-24 month delay	Challenged

Continued on next page

Table A.1 – continued from previous page

id	projectName	projectStatus	deliveryStatus	successRate
K095	Hunter's Moon Remastered	Released	On time	Successful
K096	Hyper Sentinel - a retro inspired arcade shoot 'em up	Released	6-24 month delay	Challenged
K097	In The Dark	Released	6-24 month delay	Challenged
K098	Indie Pogo	Released	On time	Successful
K099	inter-view: an interactive music experience	Released	6-24 month delay	Challenged
K100	Intrepid Izzy - PC / Dreamcast / PS4	Released	6-24 month delay	Challenged

A.2 Mentioned crowdfunded projects

Table A.2: Mentioned Kickstarter projects

Project	Status
Darkest Dungeon by Red Hook Studios	Game released and got a high rating
Shenmue 3	Game released and got a high rating
Bloodstained: Ritual of the Night	Game released and got a high rating
Star Citizen	Game has been in development for almost 10 years without releasing a full videogame
Yogventures!	The project lead admitted in a Kickstarter update that his inexperience as project lead and programmer lead to the project falling apart due to financial and staff issues
Ant Simulator	The programmer for the project had to cancel the project due to his two business partners misusing the funding, the Kickstarter campaign page for this project has also been removed
Shovel Knight	The game released, had a high rating and multiple awards
Zano	Overfunding caused the project to expand their scope beyond control and the product prototype was not functional to the degree as advertised in addition to not having their production lines ready

Continued on next page

Table A.2 – continued from previous page

Project	Status
Pebble	After their third Kickstarter campaign, the company had to shutdown and sell their assets due to financial reasons
COOLEST COOLER: 21st Century Cooler that's Actually Cooler	Did not fulfill every backer and had to shut down after several financial and logistical challenges
Game Development Mini-Degree - Learn to Code and Make Games	Example of a project filtered out from the data set due to not being a videogame
AdventureX 2017: The Narrative Games Convention	Example of a project filtered out from the data set due to not being a videogame
The Contractors - Create Character 3D Model: Nyla	Example of a project filtered out from the data set due to not being a videogame

A.3 Software development risks and measures

Table A.3: Software development risks from NPR 5326(24) supplemented by research from Woortman(40), summarized by van Dongen(33) and Eveleens(6)

ID | Source	Risk
Risk 01 | NPR 5326	The software changed, resulting in deteriorated quality of the software
Risk 02 | NPR 5326	The software environment changed, resulting in deteriorated quality of the software
Risk 03 | NPR 5326	The amount of work was not correctly estimated causing the planned functionality not to be completed on time
Risk 04 | NPR 5326	Due to scope extensions, the product is not delivered on time and within budget
Risk 05 | NPR 5326	The team does not have the right expertise, causing the software not to meet the requirements
Risk 06 | NPR 5326	Inadequate management of the work, causing the product to not offer the correct functionality
Risk 07 | NPR 5326	Functional requirements are given too much priority so that the product lacks the correct non- functional properties
Risk 08 | NPR 5326	The communication between stakeholders is suboptimal, causing misunderstanding

Continued on next page

Table A.3 – continued from previous page

ID | Source	Risk
Risk 09 | NPR 5326	Insufficient traceability of the development, use and management of customized software leads to no(non-demonstrable) compliance with obligation
Risk 10 | NPR 5326	Because a lot of time is required to meet the preconditions for software development, the product is not delivered on time
Risk 11 | Woortman	Insufficient staffing
Risk 12 | Woortman	Incorrect or optimistic status reporting
Risk 13 | Woortman	Poor perceived usability
Risk 14 | Woortman	Lack of effective development process/methodology

Table A.4: Software development risk measures from NPR 5326(24) supplemented by research from Woortman(40), summarized by van Dongen(33) and Eveleens(6)

ID | Source	Measure
Measure 01 | NPR 5326	Identify and involve stakeholders
Measure 02 | NPR 5326	Identify important non- functional requirements
Measure 03 | NPR 5326	Identify important functional requirements
Measure 04 | NPR 5326	Product decomposition in incrementally deliverable parts with business value
Measure 05 | NPR 5326	Identify technical debt, provide insights and solve it according to plan
Measure 06 | NPR 5326	Explore possible solutions, which includes prototyping
Measure 07 | NPR 5326	Incremental delivery of the product
Measure 08 | NPR 5326	Iterative development
Measure 09 | NPR 5326	Set up an automated development pipeline
Measure 10 | NPR 5326	Constantly meet the requirements using regression tests
Measure 11 | NPR 5326	Monitor progress using a burndown charts
Measure 12 | NPR 5326	An official product owner with a mandate
Measure 13 | NPR 5326	Apply a quality-driven development method
Measure 14 | NPR 5326	Archiving the documents and code after the development or the project is finished
Measure 15 | NPR 5326	Sound transfer to the customers or another team
Measure 16 | NPR 5326	Support the teams by providing specialist knowledge and resources
Measure 17 | NPR 5326	Continuous risk management
Measure 18 | Woortman	Team building

Continued on next page

Table A.4 – continued from previous page

ID | Source	Measure
Measure 19 | Woortman	Spread knowledge of product components among various people
Measure 20 | Woortman	Realistic expectations of the project team for the final product
Measure 21 | Woortman	Clearly define the needs and benefits by for example carrying out user surveys, making user characterizations or scenarios
Measure 22 | Woortman	Add a list of all known potential and relevant risks to the software project plan
Measure 23 | Woortman	Recognize and minimize bias in perceiving risk
Measure 24 | Woortman	Make clear agreements in advance on the financial distribution

Appendix B

Graphs

The graphs in this appendix were left out from section 4.2 as they did not show significant differences between variables.

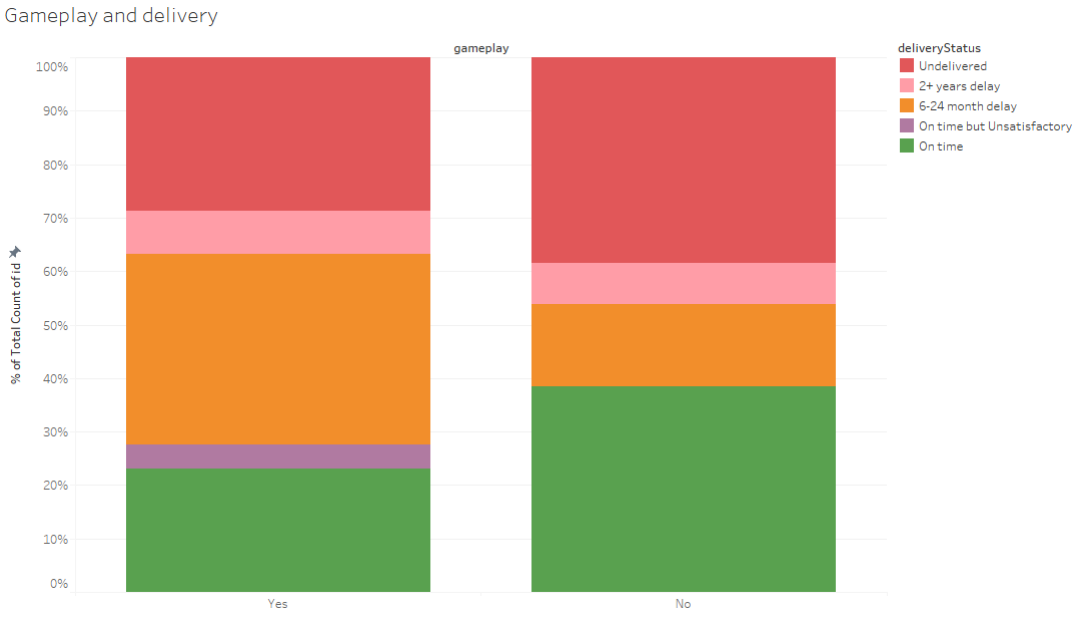

Figure B.1: Gameplay and delivery status

Figure B.2: Platform and delivery status

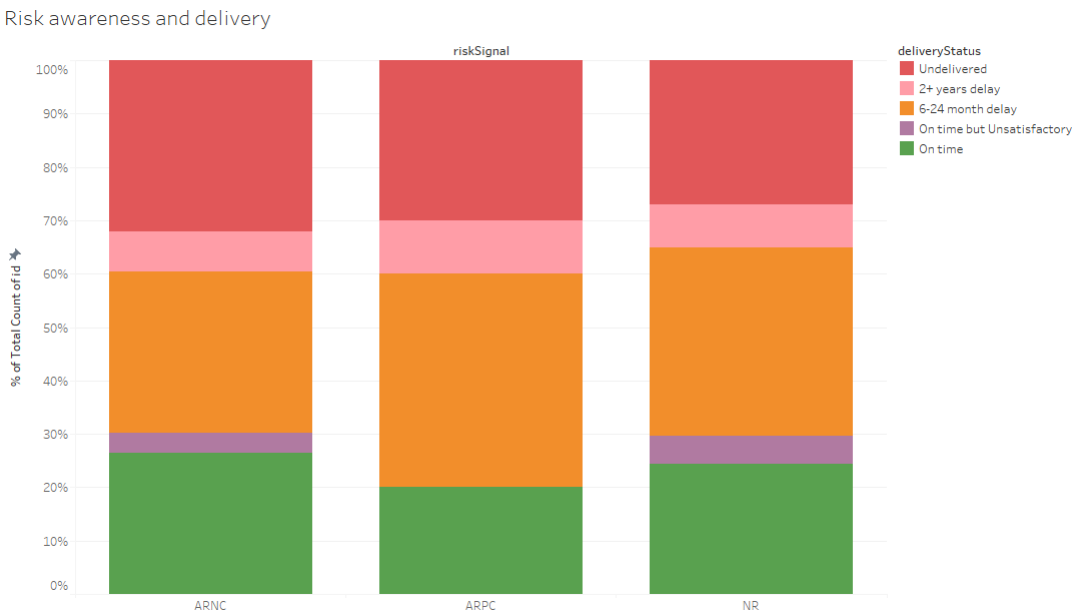

Figure B.3: Risk awareness and delivery status