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GOLDEN EGG CHECK B.V.

THE QUANTIFICATION OF START-UP PERFORMANCE

An empirical study about the determinants of early stage IT start-up success| Bryan Ruiter

UNIVERSITY OF TWENTE.

Golden Egg Check

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PREFACE

This research project is conducted to complete the author's bachelor study Industrial Engineering & Management at the University of Twente. The principal of this project, Golden Egg Check B.V., developed a tool, the Golden Egg Check, to assess the potential and feasibility of a business case. The tool is useful for assessing the start-up's potential, but it is currently not useful for monitoring the actual performance of a start-up. This research project aims to make the actual performance of a start-up more insightful by offering a model that quantitatively assesses the performance of a start-up.

I am very grateful to everyone that supported me with this project. I would like to thank the employees of the Golden Egg Check B.V. for giving me a wonderful time. Special thanks goes out to Gilles Meijer and Thomas Mensink who were closely involved with this project. And Jaap Beernink for giving me this opportunity. I would also like to thank my supervisors, from the University of Twente, Hans Heerkens and Peter Schuur for helping me with the structure of this paper and for asking the right questions. Also thanks to all the organizations that participated in this research project.

Bryan Ruiter

Enschede, 28 Augustus 2015

MANAGEMENT SUMMARY

Fifty percent of the start-ups survive the first three years. It is not sufficiently known how to predict whether a start-up will become successful. In previous literature a lot has been written on the determinants of business success and its correlation with output variables [e.g., revenue and/or profit]. Unfortunately, early stage IT start-ups, often do not have any substantial revenue or profit yet. Even when they do have revenue and profit these statistics do not necessarily reflect how good the start-up process actually is because, these statistics are effects, often lagging behind and are influenced by chance. The objective of this research is to create a model to quantify start-up performance from a process perspective that is able to predict whether a start-up is likely to become successful even when there is no reliable financial information available. But before such a model can be generated the following information needs to be known:

Which factors are determinants for early stage IT start-up success from a process perspective – and what is the relative importance of each of the determinants?

Previous research is used to identify which determinants might be important for IT start-up success and entrepreneurship experts are interviewed for their opinions on whether they think these factors are indeed important, what their relative importance is and what ideal levels of performance on these determinants are.

The identified determinants for IT start-up performance can be categorized between:

- Business case determinants (how good is the business case?)
- Entrepreneurial team determinants (how good is the entrepreneurial team?)
- Progress determinants (which events did the organization undertake?)

TABLE I: MOST IMPORTANT FINDINGS: ENTREPRENEURIAL TEAM DETERMINANTS

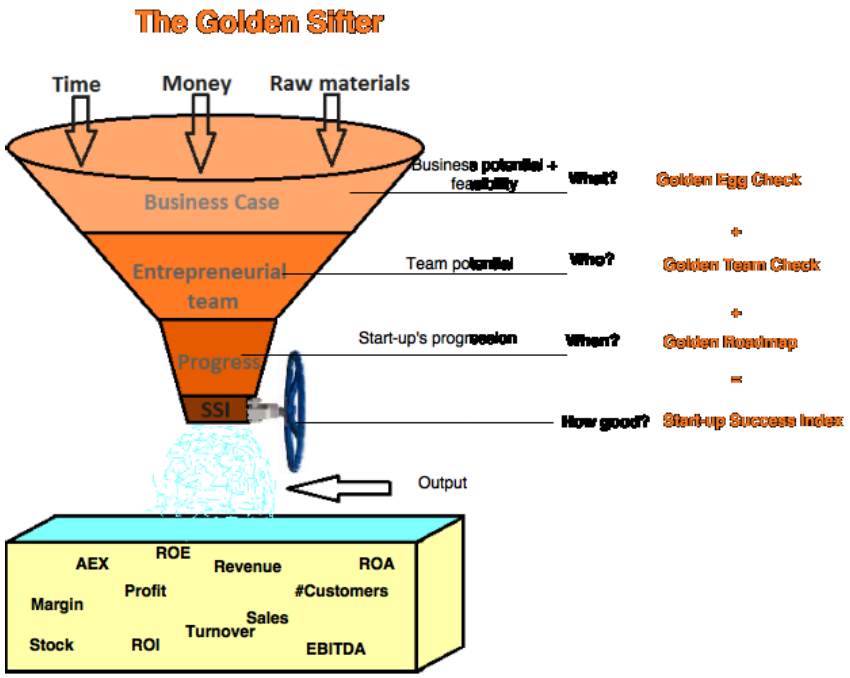
Entrepreneurial team determinants	**Rank (mean)**	**Ideal performance level**	**Entrepreneurial team determinants**	**Rank (mean)**	**Ideal performance level**
Prior start-up experience	**1** (2.6)	4 Prior start-ups	Helpful mentors	5 (5.0)	
Industry specific experience	2 (3.6)	4-8 years of experience	Working long hours	5 (5.0)	45-50 hours a week
Multiple Founders	3 (4.1)	Three founders	Managerial experience	7 (5.7)	4-8 years of managerial experience
Customer metrics	4 (4.3)		Level of education	**8** (5.8)	Master's degree

The ideal IT start-up is founded by three members all with master degrees and each of them works on average 45-50 hours a week. Throughout their careers they obtained 4-8 years of industry specific and managerial experience as well as having experience from 4 prior start-ups. To be able to make the best possible decisions they are making use of customer metrics and have a rich network of helpful mentors.

This research project uses a model, the Golden Egg Check, developed by Golden Egg Check B.V., the principal of this research, that assesses the business case characteristics of IT start-ups with the help of investment criteria that venture capitalists use to assess venture proposals. The progress determinants are compared with an ideal planning (Golden Roadmap) based on research done by the Start-up Genome project. Finally, the Golden Team Check is generated by this research project to assess the entrepreneurial team determinants based.

This research project combines the three models from above into one model. 'The Golden Sifter' (Figure I) is the visual representation of the process perspective. The Golden Sifter is a metaphor for the ideal entrepreneurial process where waste is left behind or extracted from the inputs. At the end of the "Golden Sifter" is the Start-up Success Index. This index is a quantitative model that assesses start-up performance. A high number is indicative for inputs that are converted efficiently into outputs. The higher the number, the more eficient the process is and less waste occurs. When The Golden Sifter is used to measure start-up performance, potential waste can be diagnosed and (when acting ackordingly) prevented. When the entrepreneurial process is efficient, start-up success will be (more) likely to happen.

FIGURE I: THE GOLDEN SIFTER (A PROCESS PERSPECTIVE)



1. INTRODUCTION

1.1 Introduction to the subject

In the Netherlands, in 2013, 237,340 firms were founded (CBS, 2015). Only around fifty percent of the founded firms or 'start-ups' survive the first three years (Van Praag, 2003). Even venture capitalists (VCs) who are choosing their investments carefully, are dealing with a complete loss on 34.5% of their investments (Sahlman, 1990). Apparently some start-ups succeed while others fail. This project assumes that when the determinants of success are known, entrepreneurs and VCs can make a better prediction about whether the individual business case will lead to business success. That is why this project desires to give the reader more insight into the determinants of business success and how they can be used to monitor start-up performance.

1.2 The Golden Egg Check

1.2.1 The principal

The principal of this project is Golden Egg Check B.V. (GEC B.V.) located in Enschede, the Netherlands. GEC B.V. is a software company founded in 2015 by Mr. Beernink and Mr. Meijer. GEC B.V. originated from the service company B&M Business Development (B&M). B&M, founded by Beernink and Meijer in 2006, is a company specialized in assisting start-up and growth companies and performing market analysis for external parties. Five years ago, they started with the development of an online software toolset named the Golden Egg Check (GEC). First, the GEC was a product of B&M, but since 2015 it operates as the independent GEC B.V.

1.2.2 The Golden Egg Check

The GEC is an online platform for established entrepreneurs or start-ups that want to evaluate and/or develop business cases. The GEC provides a framework to support the assessment of a business case. This framework consists of *32 criteria* to evaluate venture proposals (see Appendix I: Venture capitalists' investment criteria (The Golden Egg Check criteria)). These criteria and their relative importance are based on research about venture capitalists' product and market related investment criteria (Mensink, 2010). This evaluation can be done by either the entrepreneurial team, performing a self-assessment, or by external 'checkers' [e.g., an industry expert, a business developer, a scientist].

In order to be able to assess a business case, sufficient information needs to be presented. This information can be extracted from, for example, a business plan or a pitch. The entrepreneurial team can present this information in the GEC software by filling in specific characteristics of the business case [e.g., characteristics of the entrepreneurial team, the product, the market and the financials]. This is especially useful for external checkers because they are not always familiar with the business case yet (logically, the entrepreneurial team can assess their own business case without presenting the information). The checker can then assess these business characteristics with the help of the GEC framework (see also Figure 1.1). Every criterion is assessed on whether the criterion is fully present, somewhat present, not present, or not able to assess due to lack of information. By adding external expert checkers the accuracy of the assessment can be enhanced.

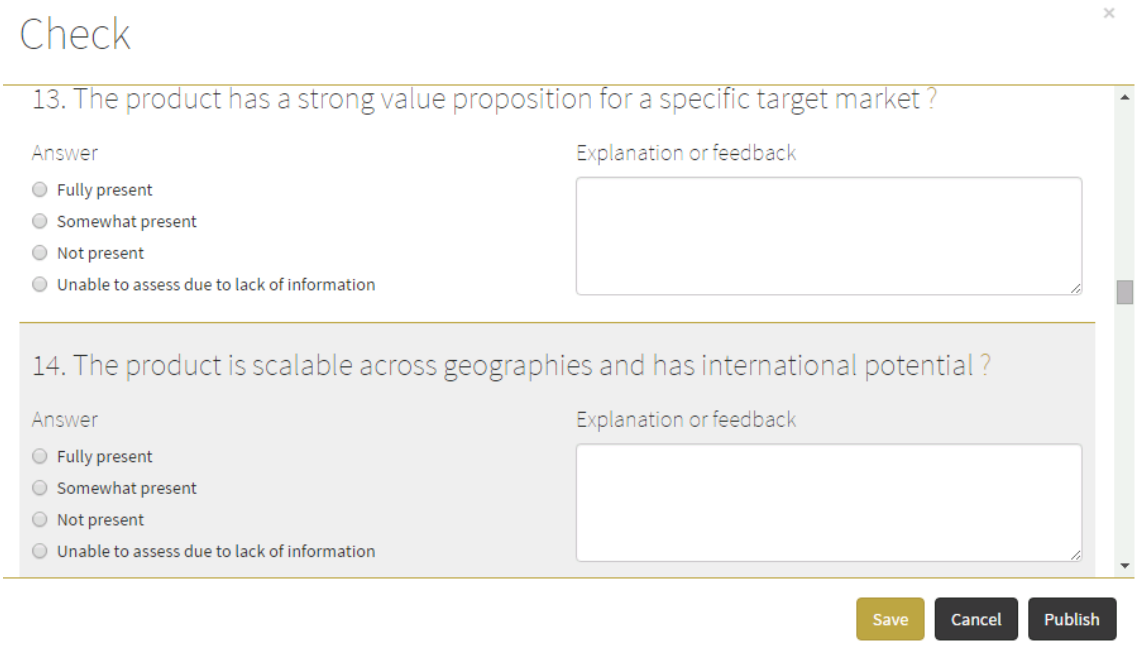


FIGURE 1.1: THE GEC FRAMEWORK (2 OF 32 CRITERIA SHOWN)

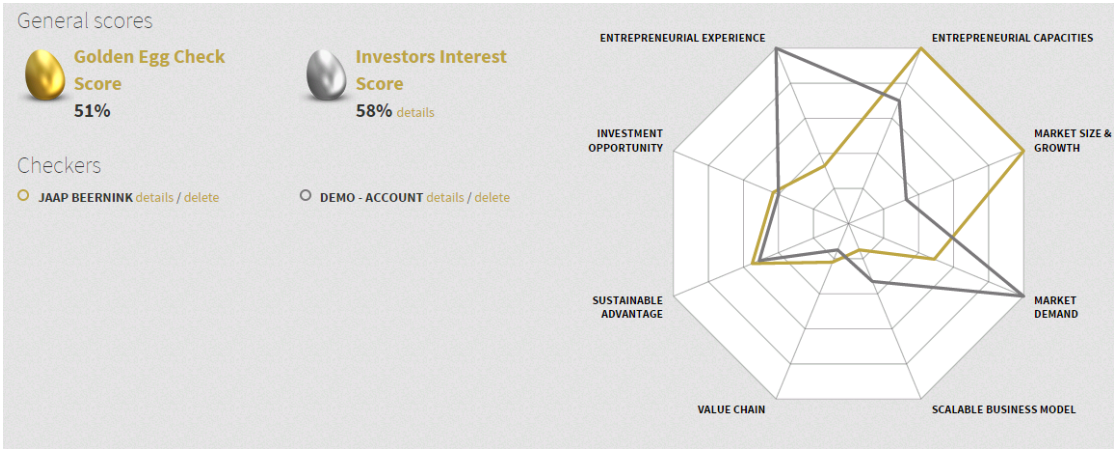


FIGURE 1.2: THE OUTPUT OF AN ASSESSMENT (EXAMPLE)

The output of an assessment (see figure 1.2) is a GEC score and an investor interest score. The GEC score is a summary of the criteria scores, multiplied with their relative importance..

$$GEC\ score = \sum_{i=1}^{32} Wi * Xi, \textit{ where Wi: Weight of criteria i, and Xi: score on criteria i.}$$

A high score is indicative for potential business success and a low score is indicative for potential business failure.

This research project aims to generate a model that can be used for the monitoring of start-up performance. Section 1.3.2: The GEC and its shortcomings for addressing this problem, addresses whether the GEC is a useful tool to monitor start-up performance.

1.3 The GEC and literature addressing this problem

In section 1.1: introduction to the subject, this research project has identified that society might have a problem: "it is not sufficiently known yet how to predict whether a start-up will become successful". But why might it be a problem? And aren't there already solutions available?

1.3.1 Why is it a problem for society?

Knowing the determinants of start-up success could prevent wasting a lot of time and money on business cases that are not likely to succeed. Investigating the determinants of start-up success is therefore relevant not only for the entrepreneurs and authorities, monitoring employment rates, but also for commercially oriented institutions like a bank, providing a loan, and GEC B.V., providing start-ups with consultancy. If one could determine which factors are determinant for the performance and are influencing the probability of start-up success, then these factors can be monitored. The monitoring of these factors could then support the entrepreneurial team whether to modify their plans or decide not to start the firm at that time (Cooper, 1993). More insight into these issues would enable both entrepreneurs as supporting organizations to make a better prediction for business success or failures (Van Praag, 2003).

1.3.2 The GEC and its shortcomings for addressing this problem

The GEC is one way of *predicting* start-up success, but the GEC score is only a snapshot of the estimated business potential and the estimated feasibility of a specific business case. The business characteristics [e.g., financial predictions, product idea and market] that the GEC assesses are not useful for measuring current business performance. It only predicts how successful a business case can potentially be, but it doesn't monitor how well the business case is exploited [e.g., it doesn't monitor which events a start-up undertakes]. Even a periodical

assessment with the GEC will not lead to the desired result, because the business characteristics that the GEC assesses are not often changing significantly over time.

The GEC often receives feedback from entrepreneurs and incubation managers/coaches saying that the GEC is useful for assessing a business case but that they miss the opportunity to *monitor* its progress and how well the entrepreneurial team is performing. Also venture capitalists are struggling with the same problem to monitor the progress of ventures they have invested in (Sahlman, 1990). But, to be able to get insight into the progress or performance of a firm, the determinants of business success should be known. B&M would like to implement these features into the GEC software but they do not have a scientific foundation for these features yet.

1.3.3 Previous research addressing this problem

In literature a lot has been written about the determinants of business success and how they can be measured. A selection of relevant literature is stated in Table 1.1. The purpose of quantifying or qualifying the performance of a firm is measuring whether a business is successful or not. The performance of a business is often measured with financial indicators [e.g., revenue, profit, return on investment] or with survival duration (Fried & Tauer, 2015; Bianchi & Biffignandi, 2012; Van Praag, 2003; Gimeno et al, 1997; Cooper et al., 1994, Duchesneau & Gartner, 1990; Stuart & Abetti, 1990)..

TABLE 1.1: LITERATURE ADDRESSING THE DETERMINANTS OF BUSINESS SUCCESS

Literature source	**Subject of literature in key words**	**Correlation with:**
Fried & Tauer, 2015	Entrepreneur performance index.	Revenue and survival
Bianchi & Biffignandi, 2012	Entrepreneur performance index	Revenue
Marmer et al., 2012	Silicon Valley, IT start-ups, addresses both progress and team characteristics.	Multiple key metrics [e.g., number of pivots, money raised, months to reach scale stage etc.]
Van Praag, 2003	Person specific determinants	Survival
Gimeno et al, 1997	Human capital determinants	Survival
Cooper et al., 1994	Human capital success determinants	Survival and growth
Duchesneau & Gartner, 1990	Success determinants	Multiple financials
Stuart & Abetti, 1990	Success determinants	Multiple financials

Unfortunately, many of the start-ups, the topic that this project is especially interested in, are firms with little or no revenue. Even when there is profit or revenue, these statistics are effects. They are not necessarily giving reliable information about how good a start-up is performing from a process perspective.

So the above mentioned financial indicators are not sufficient for measuring the performance of early stage start-ups. Survival duration solely is not a useful indicator for start-up success either, because many business dissolutions are voluntarily, and not necessarily caused by business failure. Furthermore start-ups that do exist are not necessarily successful (Van Praag, 2003).

The research done by Marmer et al., 2012 comes closest to what this project is looking for but it did not investigate any product and market related success determinants.

In literature there has not been a satisfying study yet in the direction of measuring the business performance of startups from a *process* perspective. Therefore it is interesting to solve this information gap and expand literature with this study.

1.4 Definitions

In order to prevent any confusion about definitions used in the problem statement, project scope and objectives it is necessary to give the following definitions of entrepreneurship and the entrepreneurial process.

1.4.1 Definition of entrepreneurship

The Austrian economist Joseph Schumpeter (1911) is seen as the pioneer for the present discipline of entrepreneurship. On the basis of Schumpeter's work, many different entrepreneurship definitions have been generated. However many definitions consists of the following four characteristic elements: (1) identification of entrepreneurial opportunities, (2) innovation and novelty, (3) securing of resources and formation of an enterprise/an organization, and (4) Profit-orientation taking into account reasonable risks and uncertainties (Volkmann, Tokarski, & Grünhagen, 2010). "Entrepreneurship is the process of creating something of value by devoting the necessary time and effort, assuming the accompanying financial, psychic, and social risks, and receiving the resulting rewards of monetary and personal satisfaction and independence" (Hisrisch & Peters, 2002). The definition that Hisrich and Peters generated is the definition used throughout this paper. Entrepreneurship does not necessarily mean the creation of new organizations.

1.4.2 The entrepreneurial process

The entrepreneurial process consists of functions, activities and actions that are associated with the recognition and evaluation of an entrepreneurial opportunity, the development of a business idea and the writing of the business plan, the establishment of an organization and founding of the enterprise itself, while taking into account the required resources in order to achieve and sustain a viable market establishment of the enterprise and the achievement of growth (Katz & Gartner, 1998; Shane & Venkataraman, 2000; Brush, 2001; Allen, 2003).

Marmer et al. (2012) defined six different stages to describe the entrepreneurial process (see Figure 1.3). They call them the "Marmer Stages". The authors based these stages loosely on the work of Steve Blank (Blank, 2013). This model differs from traditional entrepreneurial process models, because this model is product centric instead of company centric. The product/service determines the stage. When a company has multiple products, a company can be in multiple stages (Marmer et al., 2012).

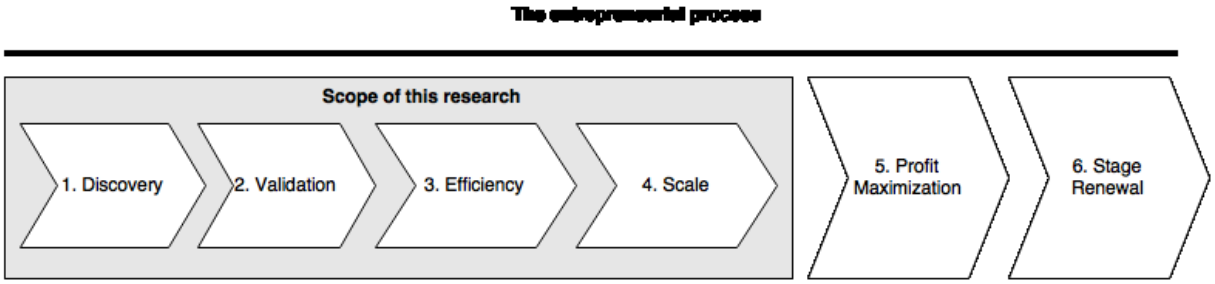


FIGURE 1.3: THE ENTREPRENEURIAL PROCESS

The focus of this research project is on firms with little or no revenue. This research project assumes that firms after the 4th stage have plenty of revenue so only the first 4 stages are the scope of this research project.

According to Marmer at al., the first four 'Marmer stages' can be described as follows:

1. Discovery: Start-ups are focused on whether they are solving a meaningful problem and whether anybody would be hypothetically interested in their solution.
2. Validation: Start-ups are looking to get early validation that their customers are willing to exchange money or attention in return for the developed product/service.
3. Efficiency: Start-ups refine their business model and are improving on the efficiency of the customer acquisition process.
4. Scale: Start-ups are attacking the market in order to drive growth very fast.

1.4.3 Implications for this project

Many different definitions of entrepreneurship are used throughout literature, the one used in this project is as follows: “Entrepreneurship is the process of creating something of value by devoting the necessary time and effort, assuming the accompanying financial, psychic, and social risks, and receiving the resulting rewards of monetary and personal satisfaction and independence” (Hisrisch & Peters, 2002). The entrepreneurial process consists of different phases with their different activities. This project uses the four “Marmer Stages”: discovery, validation, efficiency and scale to model the start-up process (Marmer et al., 2012).

1.5 Project scope and objectives

1.5.1 Project scope

Solving the problem identified in section 1.1: introduction to the subject, involves too many factors for this project. Solving the problem with a general scope would consume too many resources and/or would lead to results that are not concrete enough. For example the mentioned problem does not discriminate between the types of industry and a certain phase of the entrepreneurial process.

The focus of this project is on solving the problem for start-ups with little or no revenue. The industry chosen is IT. IT ventures are moving relatively fast through the stages. For example, compared to nanotechnology start-ups, IT start-ups have a lower time-to-market. IT start-ups are often not able to protect their intellectual property with patents so they need to progress fast in order to stay ahead of their competitors. A tool to monitor performance would be very relevant, because these IT start-ups are then able to make adjustments quickly when the tool is diagnosing to do so. Many customers of the GEC are IT ventures and this is also an industry where the author of this project has much affinity with.

IT start-ups with little or no revenue could be somewhere in between the discovery phase and the scale phase (early stage). Up to and including the scale phase, the business needs to work towards successful market establishment and it is the monitoring of this process that is the problem of this project.

TABLE 1.1: THE SCOPE OF THIS PROJECT

Variables	Focus area of this project
The industry of the venture	Internet start-ups / IT ventures
Phase of the entrepreneurial process	Discovery phase – Scale phase (early stage)

Table 1.1 presents the chosen scope of this project.

1.5.2 Project objectives

In section 1.3.3: previous research addressing this problem, is stated that there is an information gap in literature, there has not been a study yet in the direction of measuring business performance with a scope on early stage IT firms that is sufficient.

The objective of this project is to create a model to assess the start-up performance from a process perspective. In order to be able to develop such a model for firms with little or no revenue, the determinants of start-up success and the relative importance of each of the determinants are needed to be studied. When the determinants of start-up success are known, these factors can be measured with indicators. The performance could then be quantified or qualified with the help of a model. This model could lead to a feature implemented in the GEC software. So solving this issue would be relevant for both GEC and society.

1.6 Problem statement and research questions

1.6.1 Problem statement

In section 1.3.3: previous research addressing this problem, is stated that there is a discrepancy between (1) the knowledge that this project desires to have about how business performance of IT start-ups (with little or no revenue) can be measured. (2) what is actually known about this subject.

The problem statement of this project is with the area of focus elaborated in section 1.5.1 is:

Which factors are determinants for early stage IT start-up success from a process perspective – and what is the relative importance of each of the determinants?

1.6.2 Research questions

To be able to solve the problem statement above, with the scope stated in 1.5.1, several aspects of this statement should be known. Information extracted from the answers of the research questions should cover these aspects. During this report the following research questions are to be answered:

RQ1. Which definitions for business success are found in previous research – and which definition(s) is/are suitable for IT start-ups?

This question strives to identify what business success is and how it is defined in previous research. The previous research that is used to answer this question is found with the methodology presented in Appendix V**.** From the identified definitions of business success one definition will be chosen that is suitable for IT start-ups.

RQ2. Which factors are determinants for start-up success from a process perspective according to previous research?

When a suitable definition of IT start-up success is chosen, RQ2 aims to answer which factors are determinants for start-up success. This question will be answered with literature found with the methodology used in Appendix V. The result of this question should be a list of factors that are determinant for start-up success.

RQ3. What are suitable indicators for these identified determinants – and how can they be measured?

The determinants identified in RQ2 are not necessarily measurable. To be able to make these determinants measurable, indicators need to be found and a scale needs to be defined. The result of RQ3 should be a list of how each identified factor from RQ2 could be measured with the help of indicators.

RQ4. What is the relative importance of these factors that are determinant for IT start-up success from a process perspective?

Probably not all determinants are contributing equally towards IT start-up success. In order to be able to quantify start-up performance the relative importance of the factors that are contributing to the success of IT start-ups need to be investigated. An often used method to answer this question is by analyzing data from a dataset; the identified determinants and their correlation to (financial) indicators for start-up success [e.g., profit, revenue, growth etc.] are analyzed . This project takes a different approach, because the indicators of start-up success are often financial indicators or survival duration and, as mentioned before, these are less useful for early stage IT start-ups. Instead, this question is going to be answered with the help of data obtained from semi-structured interviews with entrepreneurship experts. They are going to be asked questions about what they think are the important factors that are contributing towards IT start-up success and what their relative contribution is.

1.7 Report outline

The remainder of this paper will be structured as follows. Chapter 2 will go in depth, with the help of previous research, on business success. A suitable definition for IT start-up success and the corresponding determinants of IT start-up success will be stated. The output of chapter 2 should state the answers of the first two research questions. Chapter 3 identifies how the determinants of start-up success can be measured with the help of indicators. Furthermore, different methodologies to quantify or qualify performance are discussed. The output of chapter 3 should answer RQ3. In chapter 4, the results of the interviews that are used to determine the relative importance of the factors and the desired levels of performance are investigated. The output of chapter 4 should answer RQ4. A model to quantify IT start-up performance will be presented in chapter 5 and how it can be implemented in the GEC software. In chapter 6, the problem statement will be answered, the implications of this project for entrepreneurs and the GEC will be discussed and recommendations for future research will be given.

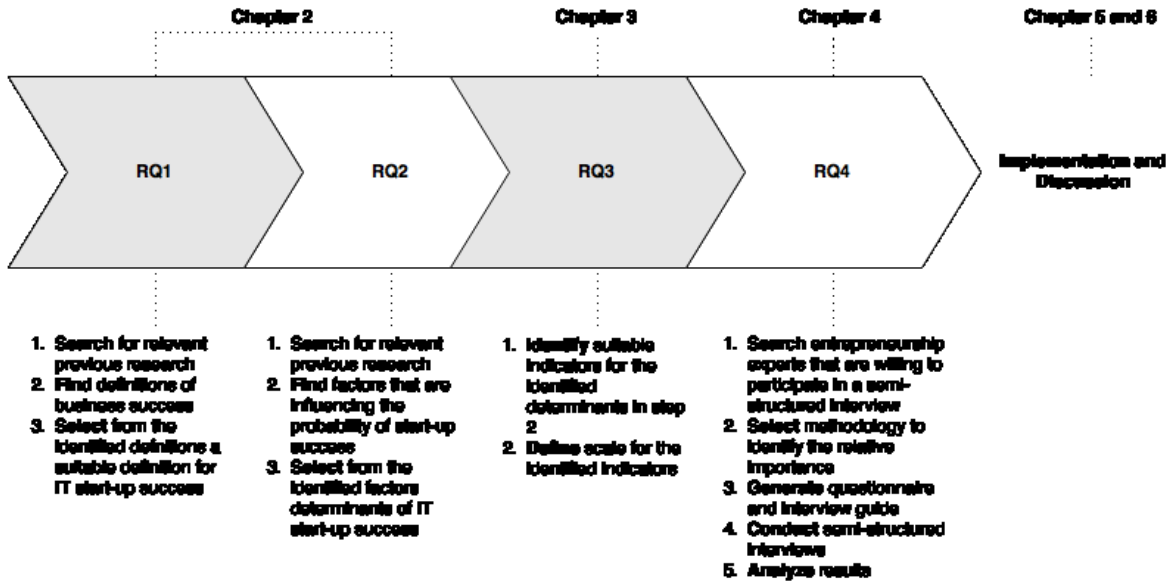


FIGURE 1.4: THE STRUCTURE OF THIS RESEARCH PROJECT

Concluding, Figure 1.4 shows the structure of this research project.

2. PREVIOUS RESEARCH ON BUSINESS SUCCESS AND ITS DETERMINANTS

This chapter aims to answer the first two research questions with the help of previous research. In section 2.1 relevant previous research on business success is stated and discussed. This information will be used to address **RQ1**: "*Which definitions for business success are found in previous research – and which definition(s) is/are suitable for IT start-ups?*". In section 2.2 previous research on determinants of business success is stated. This information is necessary in order to be able to answer **RQ2**: "*Which factors are determinants for IT start-up success from a process perspective according to previous research?*". Finally, in section 2.3, the contributions of this chapter to the research questions are stated and by doing so research question 1 and 2 are answered.

2.1 Previous research on business success

Success in self-employment has no unique definition, and therefore has been defined differently in business, psychology, and sociology (Van Praag, 2003). In business, success is seen as a multidimensional construct determined by financial and operational performance. Indicators of financial performance reflect the firms economic performance while indicators of operational performance like innovativeness might influence the financial performance (Hill, 2013; Combs et al, 2005; Venkatraman & Ramanujam, 1986).

In the past entrepreneurship research had an emphasis on the financial performance of a firm and/or the achievement of company growth as a determinant of business success (Kiviluoto, 2013). But more recent studies *criticizes* the suggested positive relationship between sales growth and profit. These studies indicate that instead of the achievement of growth, the achievement of *profitable growth* should be regarded as business success (Brännback et al., 2010; Davidsson, Steffens, & Fitzsimmons, 2009).

Several recent entrepreneurship studies are trying to connect entrepreneurship with the field of production theory to measure operational performance (Fried & Tauer, 2015; Bianchi & Biffignandi, 2012). They opt a production function approach that relies on the idea that a firm transforms inputs into outputs. The more outputs a firm can produce with fewer inputs the more successful the entrepreneurial team is (Fried & Tauer, 2015; Bianchi & Biffignandi, 2012). So *a successful firm produces some satisfying level of outputs compared to the inputs consumed in this process*.

In literature it is also suggested that the entrepreneur being satisfied about the business could be regarded as business success (Cooper & Artz, 1995; Chandler & Hanks, 1993). Or the feelings of satisfaction and completion when the business career is over (Hill, 2013).

As mentioned before, survival duration is often used as an indicator for business success. However, solely focusing on the duration that a venture exists has little to do with the success in business, firms that do exist are not necessarily successful and a large part of the business dissolutions are voluntary instead of mandatory caused by business failure (Van Praag, 2003). A business dissolution can either be a compulsory exit or a voluntary exit. The compulsory exit is due to insufficient opportunity, often financial, to continue in business. Van Praag, 2013 associates this compulsory exit route with business failure. On the other hand business success or entrepreneurial success is associated with whether a firm can stay in business without the necessity of a compulsory exit (Van Praag, 2003).

Different definitions of business success are identified above, although not all definitions are suitable for measuring IT start-up success. In section 2.3.1, research question 1 will be answered and by doing so a suitable definition for IT start-up success will be stated. A suitable definition for IT start-up success from a process perspective is (which will be further elaborated in section 2.3.1):

> *Business success could be regarded as the entrepreneur or other key actors being satisfied about the level of outputs produced relative to the inputs consumed in this process (Fried & Tauer, 2015; Bianchi & Biffignandi, 2012; Cooper & Artz, 1995; Chandler & Hanks, 1993)*

2.2 Previous research on the determinants of business success

In order to understand the determinants of business success, knowledge about what business success is should be obtained first. Fortunately, in the previous section is stated which definitions are found for business success from previous research.

A lot of research has been done about the determinants of entrepreneurial success, especially on the topics addressing the characteristics of a successful business case, a successful entrepreneurial team and successful progress. (Fried & Tauer, 2015; Marmer, Herrmann, Dogrultan, & Berman, 2012; Van Praag, 2003; Gimeno et al, 1997; Cooper et al., 1994; Duchesneau & Gartner, 1990; Stuart & Abetti, 1990). To be able to identify current and future successful ventures it is important to determine the drivers of successful ventures (Fried & Tauer, 2015).

It is of no doubt that higher economic performance, when non-economic performance remains equal, increases the likelihood of survival (Gimeno et al, 1997). But it is especially relevant for start-ups or pre-revenue firms whether non-economic performance influences the likelihood of survival as well. When comparing firms with the same economic performance, different mortality rates for firms exists, indicating that firms have different minimum viable levels of economic performance or that the non-economic performance is influencing the mortality rate. According to Gimeno et al, 1997 organizational survival is influenced by both the determinants of economic and non-economic performance and minimum viable levels of performance.

Above is identified that it is relevant to investigate the determinants of non-economic performance, because these determinants are influencing the probability of business success. It is also identified that the determinants of business success can be categorized from a process perspective between:

- Characteristics of a successful business case (How good is the idea?)
- Characteristics of a successful entrepreneurial team (How good is the entrepreneurial team that will be exploiting this idea?)
- Characteristics of successful progress (How long does the organization exists, which stage is the organization in, and which events did the organization complete?)

The next sections will go in depth on these three categories of determinants.

2.2.1 Determinants of a successful business case

As identified in Chapter 1.4.2: the entrepreneurial process, before a firm is founded, a business opportunity is recognized based on a business idea and the corresponding market potential (the business case characteristics) (Volkmann, Tokarski, & Grünhagen, 2010). Recognizing and selecting the right opportunities is one of the most important abilities of a successful entrepreneur (Stevenson et al., 1985). The existence of a right opportunity means there are also opportunities that are less feasible. This process of recognizing and selecting an opportunity could ultimately lead to a venture proposal. Each year venture capitalists screen hundreds of venture proposals before deciding whether to invest or to not invest in a venture (Sahlman, 1990). Over the years, venture capitalists have obtained experience with which investment criteria to assess in order to predict whether a business will become successful or not.

As mentioned before in section 1.2.2: The Golden Egg Check , research has been done about how venture capitalists evaluate IT venture proposals (Mensink, 2010). It is this research that is used as a base for the GEC criteria. The findings of that research, are stated in Appendix I, the GEC criteria are highlighted. For example, according to Mensink's research, the five most important

investment criteria used in the Netherlands are: (1) the revenue model is scalable, (2) the technology is scalable, (3) the entrepreneur can demonstrate a market demand, (4) the target market has a large growth potential and (5) people will pay for the product. These five investment criteria belong to the thirty-two GEC criteria as well. The GEC is available for this research project to assess a business case. In section 3.1.1 is explained which criteria belong the GEC framework and why the GEC is a useful tool to assess a business case.

A business opportunity is recognized based on a business idea and the corresponding market potential. Recognizing and selecting the right opportunities is one of the most important abilities of a successful entrepreneur.

2.2.2 Determinants of the successful entrepreneurial team

Human capital plays a critical role in the success of a new venture. It is the entrepreneurial team that gathers resources and develops strategies to move the product through the market. Resources alone are not enough to achieve competitive advantages and above-average performance (Kakati, 2003). In Table 2.1 human capital determinants for business success are obtained from various sources. Often used performance indicators are for example: education level, industry specific experience, managerial experience and prior start-up experience.

In addition the ability to learn from a best practice influences the probability of business success (Marmer et al., 2012). Usually when venture capitalists invest in a company they become actively involved in the management of the company (Sahlman, 1990). This increases the company's performance because companies with helpful mentors are for example more likely to raise money than companies without a mentor (Marmer et al., 2012). Not only a venture capitalists belongs to the group of possible helpful mentors but also an industry guru, innovation coach, incubator and accelerator.

The ability to listen to customer feedback influences the probability of business success. Companies that are monitoring customer metrics have higher growth rates than companies that are not tracking customer metrics (Marmer et al., 2012). Firms that are not acting accordingly on feedback tend to scale without validating the size and interest of the market. This results in the need to pivot the product more often. Every pivot costs time and money, unnecessary pivots should be prevented (Marmer et al., 2012).

TABLE 2.1: HUMAN CAPITAL DETERMINANTS FOR BUSINESS SUCCESS

Authors	**Focus**	**Determinants of business success (positive effect)**	**Determinants of business success (negative effect)**
Bosma et al., 2004	Dutch entrepreneurs	Education level, Industry specific experience, Male, Working long hours	Outside job
Cooper et al., 1994	Worldwide entrepreneurs	Education level , Industry specific experience	Minority race
Duchesneau & Gartner, 1990	US entrepreneurs	Entrepreneurial parents, Personal investment, Prior-startup experience, Risk reducing behavior, Working long hours	
Gimeno et al, 1997	US entrepreneurs	Education level , Managerial experience, Multiple founders, Prior-startup experience	Outside job
Kakati, 2003	High-tech entrepreneurs	Capability to act on feedback , Creativity, Industry specific experience, Managerial experience	
Marmer et al., 2012	Internet start-ups from Silicon Valley (US)	Ability to learn from a best practice, Ability to track customer metrics, Capability to act on feedback, Helpful mentors, Multiple founders	
Nielsen, 2015	Danish academic entrepreneurs	Education level, Industry specific experience, Multiple founders	
Stuart & Abetti, 1990	Technical US ventures	Managerial experience, Prior start-up experience	

When looking at Table 2.1, striking is that there are a lot more determinants identified with a positive effect than there are determinants with a negative effect. This might be because the focus in literature is often on business success rather than on business failure. The author suggests that future research about *business failure* determinants would be very useful.

The human capital determinants stated in Tabel 2.1 will be used to answer research question 2 in section 2.3.2.

2.2.3 Determinants of successful progress

What the entrepreneurial team is doing in their day-to-day activities matters (Carter, Gartner, & Reynolds, 1996). The kinds of events they undertake, how many events, and the sequence of these events have a significant influence on the ability to create a successful venture (Carter, Gartner, & Reynolds, 1996; Marmer et al. 2012). Start-ups evolve through different stages of development, all can be identified with specific milestones and thresholds (Marmer et al., 2012). Start-ups that are not moving consistently through the stages are called inconsistent, this would happen when the start-up is completing events from a stage, but has not achieved the completion milestones from a previous stage. This often happens when firms scale prematurely (Marmer et al., 2012). According to research done for the Start-up genome report, inconsistent start-ups are pivoting very often, or not at all. Indicating they make a lot of costs, pivoting very often, or aren't aware of what the market demands when they aren't pivoting at all (Marmer et al., 2012). Consistent companies raise significant more money and grow their employees significant faster than inconsistent companies (Marmer et al., 2012).

Marmer et al., 2012 defined 6 different stages, and their average duration, but only 4 of them are within the scope of this research project (see section 1.4.2: the entrepreneurial process). Marmer et al., 2012 identified events that are characteristic for a certain stage of an IT start-up. These events and their corresponding stages and duration are stated in Figure 2.1.

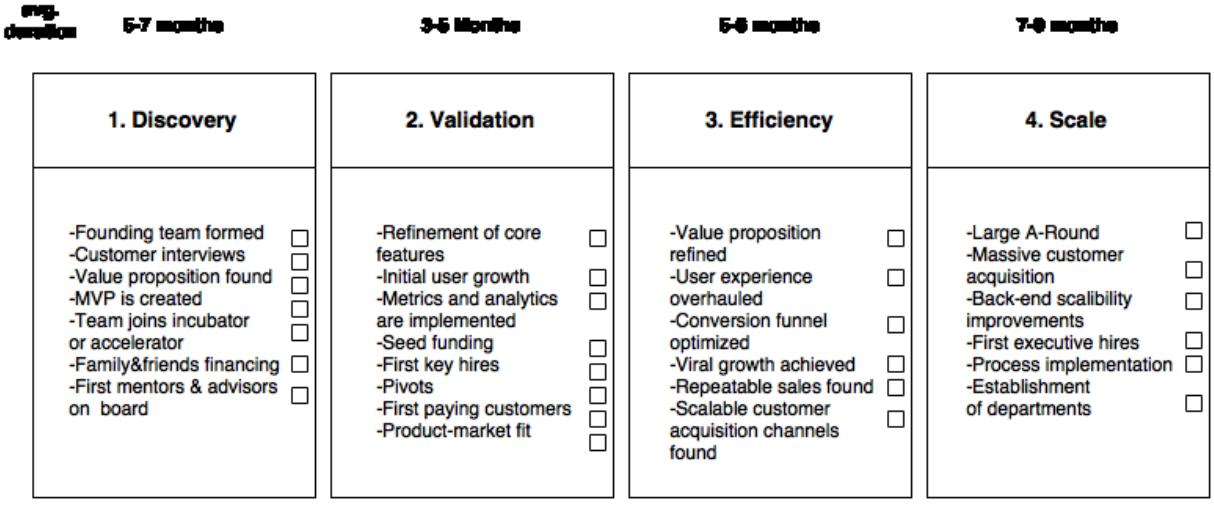


FIGURE 2.1: EVENTS FOR CORRESPONDING MARMER STAGES FOR IT INDUSTRY

The in figure 2.1 presented events are used by this research project to generate an IT start-up roadmap. The actual progress of an IT start-up can then be compared with this roadmap to determine whether an IT start-up is "doing the right things" (this will be further elaborated in section 3.2.3). This means: completing the right events, in the right phase en within the right

time. A start-up is not progressing optimal when it is not completing events, and/or taking a lot more time than average, and/or completing events that are not consistent with the 'Marmer stage' the start-up is in.

Determinants of successful progress are:

- *Type of events that are completed*
- *Whether the event that is completed is consistent with the 'Marmer stage' the start-up is in*
- *Time (Time that is elapsed since the founding of the organization)*

These identified determinants of successful progress will be used to answer research question 2 in section 2.3.2.

2.3 Contributions of this chapter to the research questions

This chapter has identified the definitions and conclusions of previous research about business success. Furthermore, determinants of business success from a process perspective have been identified. Now that this information is stated, the first and second research question can be solved.

2.3.1 RQ1: What definitions are used for business success in previous literature – and which definition(s) is/are suitable for start-ups?

This project has identified the following definitions of business success:

- The achievement of profitable growth should be regarded as business success (Brännback et al., 2010; Davidsson, Steffens, & Fitzsimmons, 2009).
- A successful firm produces some satisfying level of outputs compared to the inputs consumed in this process (Fried & Tauer, 2015; Bianchi & Biffignandi, 2012).
- The entrepreneur being satisfied about the business could be regarded as business success (Cooper & Artz, 1995; Chandler & Hanks, 1993).
- The feelings of satisfaction and completion when the business career is over (Hill, 2013).
- Business success is the ability to survive without the necessity of a compulsory exit (Van Praag, 2003).

But not all definitions are suitable for the scope of this research: IT start-ups. These firms often have costs that are exceeding the cash inflows. Therefore the achievement of profitable growth is not a suitable definition for business success for these firms. Because by definition most start-ups are then not able to be successful. The definition opted by Hill is not a suitable definition

because the objective of this research is to measure the performance of still going companies. A possible definition of business success is opted by van Praag, the definition is as follows: Business success is the ability to survive without the necessity of a compulsory exit (Van Praag, 2003). But, as mentioned before, survival rate solely is not very useful for this research project. A suitable definition of business success is when "a start-up produces a satisfying level of outputs relative to the inputs consumed in this process". This in combination with the definition that "the entrepreneur or other key actors being satisfied about the business could be regarded as business success" could be merged into one new definition for business success. The new definition then is as follows: business success could be regarded as the entrepreneur or other key actors being satisfied about the level of outputs produced relative to the inputs consumed in this process.

This project has a focus on business success from a process perspective, so the transformation process from inputs into outputs is very relevant. The definition for business success used in this project is:

> *Business success could be regarded as the entrepreneur or other key actors being satisfied about the level of outputs produced relative to the inputs consumed in this process (Fried & Tauer, 2015; Bianchi & Biffignandi, 2012; Cooper & Artz, 1995; Chandler & Hanks, 1993)*

2.3.2 RQ2: Which factors are determinant for start-up success of IT start-ups according to previous research?

In section 2.2 this project has identified that determinants of IT start-up success can be categorized between determinants of a successful business case (Table 2.2), determinants of the successful entrepreneurial team (Table 2.3) and determinants of successful progress (Table 2.4).

TABLE 2.2: DETERMINANTS OF THE SUCCESSFUL VENTURE

Determinants of a successful business case	Selecting the right opportunity	Stevenson et al., 1985
	Characteristics of the business case itself	Volkmann, Tokarski, & Grünhagen, 2010

TABLE 2.3: DETERMINANTS OF THE SUCCESSFUL ENTREPRENEURIAL TEAM

Determinants of the successful entrepreneurial team	Ability to learn from best practice	Marmer et al., 2012
	Ability to track customer metrics	Marmer et al., 2012
	Capability to act on feedback	Kakati, 2003; Marmer et al,

		2012
	Creativity	Kakati, 2003
	Education level	Bosma et al, 2004; Cooper et al., 1994; Gimeno et al, 1997; Nielsen, 2015
	Entrepreneurial parents	Duchesneau & Gartner, 1990
	Industry specific experience	Bosma et al, 2004; Cooper et al., 1994; Kakati, 2003; Nielsen, 2015; Mensink, 2010
	Managerial experience	Gimeno et al, 1997; Kakati, 2003; Stuart & Abetti, 1990
	Gender	Bosma et al, 2004
	Helpful mentors	Sahlman, 1990; Marmer et al., 2012
	Race	Cooper et al., 1994
	Multiple founders	Duchesneau & Gartner, 1990; Gimeno et al, 1997; Marmer et al, 2012; Nielsen, 2015
	Personal Investment	Duchesneau & Gartner, 1990
	Prior start-up experience	Duchesneau & Gartner, 1990; Stuart & Abetti, 1990
	Risk reducing	Duchesneau & Gartner, 1990
	Working long hours	Bosma et al., 2004 Duchesneau & Gartner, 1990 Mensink, 2010

TABLE 2.4: DETERMINANTS OF SUCCESSFUL PROGRESS

Determinants of successful progress	Type of events that are completed	Carter, Gartner, & Reynolds, 1996; Marmer et al., 2012
	Whether the event that is completed is consistent with the 'Marmer stage' the IT start-up is in	
	Time (time that is elapsed since the founding of the organization)	

The above stated determinants are used by this research project to quantify IT start-up performance. These determinants are not necessarily directly measurable. In order to be able to measure these determinants indicators are needed to be found and a scale needs to be defined. Chapter 3 will address these topics.

3. METHODOLOGIES TO QUANTIFY START-UP PERFORMANCE

In chapter 2, addressing RQ2, is identified that the determinants of start-up success from a process perspective can be categorized between three categories: (1) determinants of a successful business case, (2) determinants of a successful entrepreneurial team, (3) determinants of successful progress. Before being able to quantify start-up performance, the individual determinants extracted from RQ2 are needed to be studied further. This chapter aims to answer **RQ3**: *What are suitable indicators for these identified determinants (section 3.1)– and how can they be measured (section 3.2)?*

3.1 Indicators for the determinants of start-up success

3.1.1 Indicators for the determinants of a successful business case

In section 2.2.1: determinants of a successful business case, and Table 2.2 is stated that the determinants of a successful business case are (1) selecting the right opportunity and (2) the characteristics of the business case itself. It is also mentioned that "*the GEC is already available for this project to assess the quality of a business case*". However, in order to be able to identify whether the GEC can be used as an indicator for (1) and (2); information needs to obtained about what a "right opportunity" is – if it is selected by the entrepreneur and whether the GEC assesses (1) and (2).

It is not so obvious what a right opportunity entails. An opportunity is a chance to meet a market need by delivering a product of superior value through a creative combination of resources (Schumpeter, 1934; Kirzner, 1973; Casson, 1982). In other words: whether the entrepreneur is solving a meaningful problem and if there are enough people interested in the solution (Marmer et al, 2012).

This research project will now state which GEC criteria (Appendix I) corresponds, according to the author, with the determinants of a successful business case.

Meet a market need, solving a meaningful problem and whether there are enough people interested in the solution corresponds with the following GEC criteria:

- People will pay for the product.
- The target market is clear and can be defined.
- The entrepreneur can demonstrate a market demand.
- There is a large total available market.

- The target market has a large growth potential.

Delivering a product of superior value through a creative combination of resources corresponds with the following GEC criteria:

- The product has a strong value proposition for a specific market.
- The venture chose the most attractive position in the value chain.
- The technology provides a sustainable competitive edge.

So a *right opportunity* is determined by whether the individual criteria from above are from a sufficient level. This project has identified above what a right opportunities entails. But also (2), the characteristics of the opportunity itself, is an important determinant of a successful business case. (Other) Business case characteristics correspond with the following GEC criteria:

- The technology has IP protection.
- The technology is scalable.
- The product is ready to market or has short time to market.
- The venture is able to (know how to) defend their market in 2-3 years.
- The product is scalable across geographies and has international potential.
- Uncertain political factors do/will not interfere the market.
- Competitors are present and known.
- Revenue model is scalable.
- Revenue model is attractive.

The above mentioned individual criteria (see also Table 3.1) are not directly *quantitatively* measurable indicators per se. But these GEC investment criteria are *qualitatively* assessed by expert checkers to determine the potential and feasibility of a business case.

TABLE 3.1: DETERMINANTS OF A SUCCESSFUL BUSINESS CASE WITH INDICATORS

Determinants of a successful business case	**Determinant**	**GEC criteria**
	Selecting the right opportunity, characteristics of the business case itself.	- People will pay for the product. - The target market is clear and can be defined. - The entrepreneur can demonstrate a market demand. - There is a large total available market. - The target market has a large growth potential. - The product has a strong value proposition for a specific market. - The venture chose the most attractive position in the value chain. - The technology provides a sustainable competitive edge. - The technology has IP protection. - The technology is scalable. - The product is ready to market or has short time to market. - The venture is able to (know how to) defend their market in 2-3 years. - The product is scalable across geographies and has international potential. - Uncertain political factors do/will not interfere the market. - Competitors are present and known. - Revenue model is scalable. - Revenue model is attractive.

Table 3.1 suggests that the GEC is a useful tool to determine whether a business case is likely to become successful. The GEC criteria addresses both whether a business case is a right opportunity and the characteristics of the business case itself. *However, the author could be biased; in order to be able to check whether this statement is a valid statement, data obtained from entrepreneurship experts will be analyzed (this will be further elaborated in section 4.1.2: the semi-structured interview).*

This research project uses the GEC score as an indicator for the determinants of a successful business case.

3.1.2 Indicators for the determinants of a successful entrepreneurial team

From information stated in section 2.2.2: determinants of the successful entrepreneurial team, and Table 2.3, sixteen different determinants of the successful entrepreneurial team can be obtained. These sixteen different determinants all have support from literature. This project uses the determinants that are found to be significant determinants by at least two different research papers; from the initial sixteen determinants, eight remain. These eight determinants (see Table 3.2) are all enhancing the probability of start-up success. The 8 determinants that are not in this table are: ability to learn from best practice (combined with helpful mentors), ability to track customer metrics (combined with capability to act on feedback), creativity, entrepreneurial parents, gender, race, personal investment and risk reducing.

TABLE 3.2: DETERMINANTS OF THE SUCCESSFUL ENTREPRENEURIAL TEAM WITH INDICATORS

Determinants of the successful entrepreneurial team	**Determinant**	**Indicator**	**Scale**
	Capability to act on feedback (customer metrics)	The use of customer metrics for supporting managerial decisions (Marmer et al., 2012).	0=Team is using customer metrics 1= Team is not using customer metrics
	Education level	Education level of entrepreneurial team members (Cooper et al., 1994; Nielsen, 2015).	0=Member has less than a high school diploma 1=Member has a high school diploma 2=Member did some college, but no degree 3=Member has an associate degree(MBO) 4=….. Bachelor's degree 5=….. Professional degree 6=…. Master's degree 7= ….. Doctoral degree
	Industry specific experience	Number of years of industry specific experience of entrepreneurial team members (Nielsen, 2015).	0=Member has no experience 1=0-½ years of experience 2=½-1 years of experience 3=1-2 years of experience 4=2-4 years of experience 5=4-8 years of experience 6=8-16 years of experience 7=16+ years of experience
	Managerial experience	Number of years of managerial experience of entrepreneurial team members (Stuart & Abetti, 1990).	0=Member has no experience 1=0-½ years of experience 2=½-1 years of experience 3=1-2 years of experience 4=2-4 years of experience 5=4-8 years of experience 6=8-16 years of experience 7=16+ years of experience

	Prior start-up experience	Number of prior start-ups that the entrepreneurial team has experience with (Stuart & Abetti, 1990).	0=No prior experience 1=1 Prior start-up 2=2 Prior start-ups 3=3 Prior start-ups 4=4 Prior start-ups 5=5 Prior start-ups 6=6 Prior start-ups 7=7+ Prior start-ups
	Multiple founders	Number of founders (Duchesneau & Gartner, 1990; Nielsen, 2015).	0=1 Founder 1=2 Founders 2=3 Founders 3=4 Founders 4=5 Founders 5=6 Founders 6=7 Founders 7=8+ Founders
	Helpful mentors	(best-practice) Mentors involved with the entrepreneurial team (Marmer et al, 2012).	0=Team has no mentors 1= Team is using mentors
	Working long hours (full-time or more)	Number of hours worked by the entrepreneurial team (Bosma et al, 2004).	0=0-20 hours per week 1=20-25 hours per week 2=25-30 hours per week 3=30-35 hours per week 4=35-40 hours per week 5=40-45 hours per week 6=45-50 hours per week 7=50+ hours per week

The indicators for the above identified determinants are not necessarily obvious. For example, an indicator of the determinant 'industry specific experience' could also be 'number of industry specific firms the team member has experience with', or 'number of people the team member knows in a specific type of industry'. The chosen indicator for industry specific experience, in this research project, is: 'number of years of industry specific experience of entrepreneurial team members'. The author expects that with more years of experience in a certain type of industry, the network size of the team member likely increases and it is more likely that the member has experience with multiple firms.

The chosen indicators all have support from literature. However the defined scale is not always the same. For example, this research project scaled on a specific type of degree while Cooper et al, 1994 scaled as follows: 0 = lower than a bachelor degree, 1 = bachelor degree or higher. This research project chose a more specific scale in order to be able to get more concrete results for desired levels of these indicators.

The relative importance and desired levels of these indicators will be determined by an analysis of the data obtained from interviews with entrepreneurship experts. The author expects that more is not necessarily better. For example, there might be higher levels of experience or education that perform worse than lower levels.

3.1.3 Indicators for the determinants of successful progress

The determinants of successful progress are already identified in section 2.2.3 and Table 2.4. The determinants are (1) the type of events that are completed, (2) time elapsed since start-up and whether (3) the completed events are consistent with the 'Marmer stage' the IT start-up is in.

TABLE 3.3: DETERMINANTS OF SUCCESSFUL PROGRESS WITH INDICATORS

Determinants of successful progress	**Determinant**	**Indicator**
	Type of event that is completed	Whether a specific event is completed on the roadmap.
	Time	Time elapsed since start-up.
	Consistency with phase	Whether the completed event is consistent with the 'Marmer stage' of the IT start-up.

This research project desires to compare the actual progress of an IT start-up with a roadmap (planning) to identify whether a start-up is doing "the right things" and whether it is progressing. How the in Table 3.3 stated determinants with the corresponding indicators will be of use will be further elaborated in section 3.2.3: *The Golden Roadmap*.

3.2 Methodologies to quantify start-up performance

So far, this project has identified the determinants of IT start-up success from previous research and stated suitable indicators to measure these determinants. But in order to be able to quantify start-up performance the individual indicators are needed to be measured and compared with desired values. This section will cover how these indicators are going to be measured.

3.2.1 Monitoring business case success

In sections 1.2.2 and 1.3.2 is mentioned that the GEC is a tool for predicting the potential and the feasibility of a business case. In section 3.1.1 is stated which criteria the GEC assesses and why the author suggests that the GEC score is a usable indicator for the determinants of a successful business case.

The GEC score is used by this research project to assess whether a business case has potential and if it is feasible. This assessment should be done every time some characteristic of the business case has significantly changed. Because it is very likely that the 'checker' will evaluate the business case different than before. The progress on the business case characteristics can be derived from the comparison of different check moments with each other.

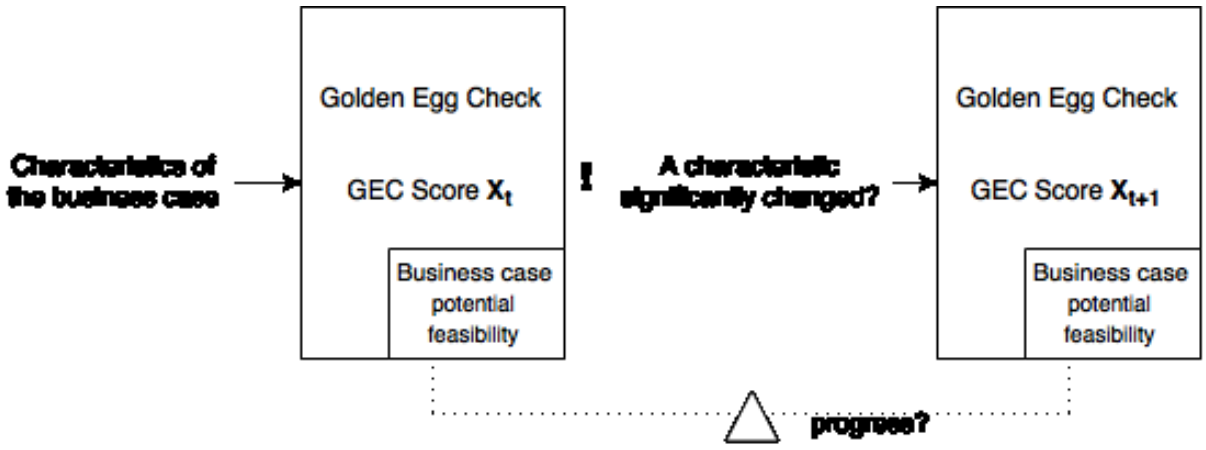


FIGURE 3.1: MONITORING BUSINESS CASE SUCCESS (GOLDEN EGG CHECK)

3.2.2 Monitoring entrepreneurial team success

Indicators for the determinants of a successful entrepreneurial team are stated in Table 3.2. These indicators [e.g., years of managerial experience and level of education] are not difficult to measure. However it is difficult to define what desired levels of these measurements are. How much managerial experience is desired? Is it ten years? Or is it some other number of years? Is twenty years of managerial experience significantly worse than thirty years or maybe even better? Or is there not much difference? In order to be able to make a prediction of entrepreneurial team performance, questions like these are needed to be answered. This project has asked several entrepreneurship experts for their professional opinion on desired levels of these indicators. The methodology and results of this research will be presented in the next chapter.

The performance on the team criteria can then be obtained from the utility functions that are generated based on data obtained from the conducted interviews and questionnaires. The performance on all of the individual criteria can then be multiplied with their relative importance in order to be able to obtain a "Golden Team Check score". The "Golden Team Check (GTC)" is suggested by the author as a name for the team assessment.

When a (new) team member is added or removed, the GTC needs to be done again. The level of progress can then be obtained from comparing the two check moments with each other (see Figure 3.2).

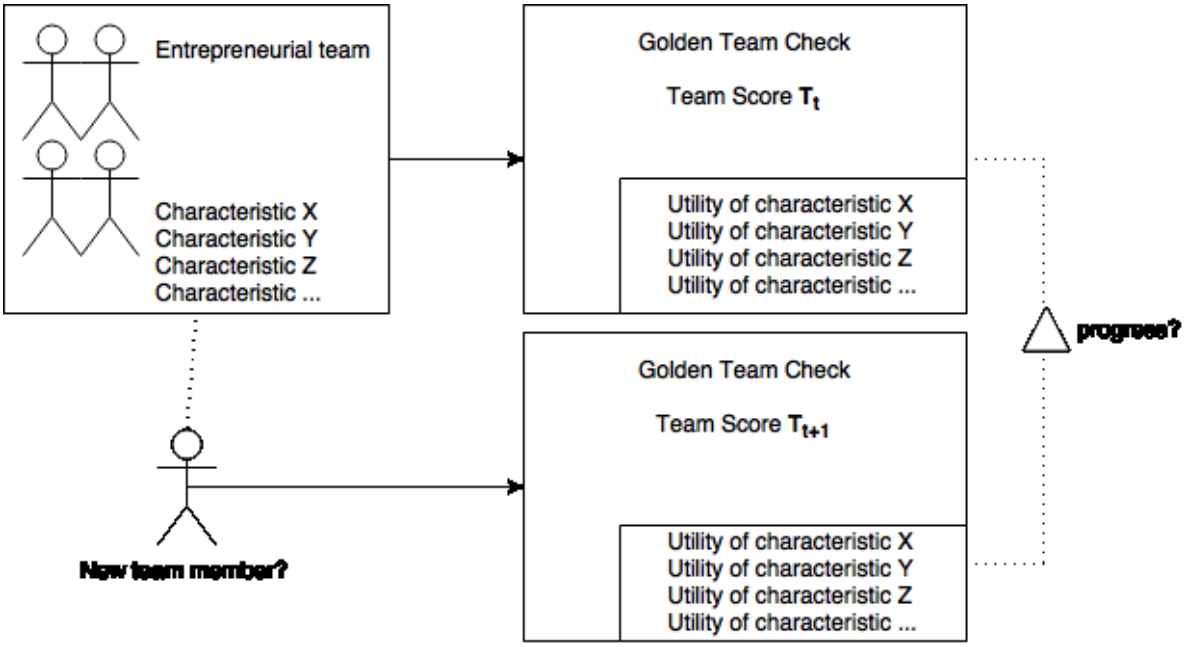


FIGURE 3.2: MONITORING ENTREPRENEURIAL TEAM SUCCESS (GOLDEN TEAM CHECK)

3.2.3 Monitoring successful progress

In section 3.1.3: indicators for the determinants of successful progress, is stated that the extraction of meaningful information from the identified indicators of successful progress is difficult; and that it should be compared with a roadmap of ideal progression or desired levels of indicators. An ideal roadmap can be created from the events identified by Marmer et al., these events are stated in section 2.2 (see also Figure 3.3).

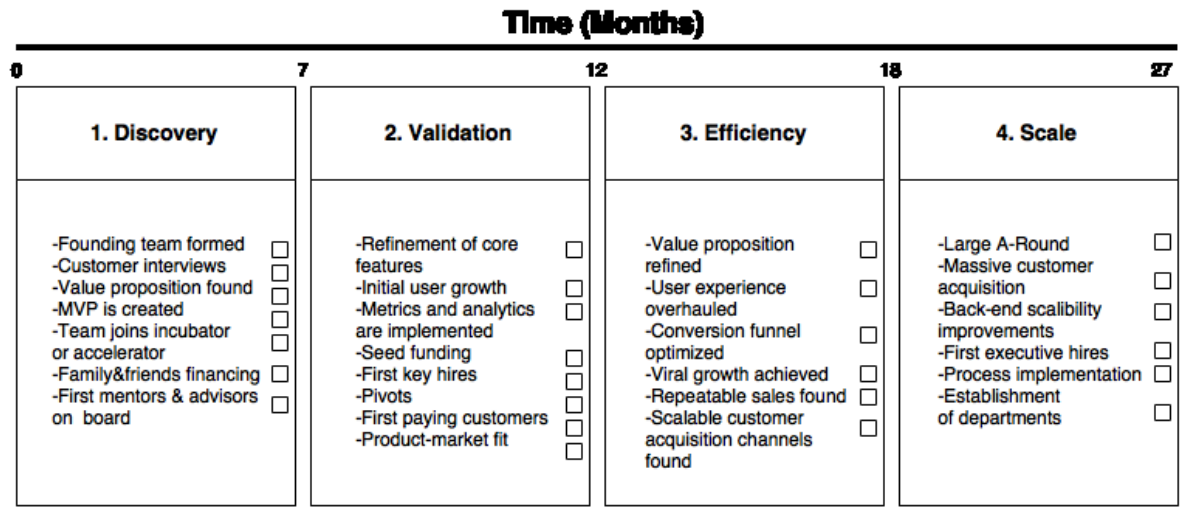


FIGURE 3.3: MONITORING SUCCESSFUL PROGRESS (GOLDEN ROADMAP)

The following indicators are identified in section 3.1.3: (1) whether a specific event is completed on the roadmap, (2) time elapsed since start-up and (3) consistency with the 'Marmer stage' of the IT start-up. The roadmap, which the author calls the "Golden Roadmap (GRM)", stated in Figure 3.3, is used by this research project to compare the actual progression of a start-up with desired progression. In order to be able to monitor the progression of a start-up; a start-up should mark an event as completed, when they have completed a specific event. When this is done, metrics can be tracked; whether a firm is progressing at all, how fast, and how consistent they are moving with what is perceived by the author, as ideal progression.

The GRM is used by this research project to track the progress of an IT start-up. When all activities are completed within the right timeframe and in the right order an IT start-up scores 100%. But no matter how good an IT start-up performed in the past, stagnation means decline. For more info on a possible scoring system used in the GRM see Table 3.4. See Figure 3.4 for an example of how it could graphically look like.

TABLE 3.4: GOLDEN ROADMAP SCORING SYSTEM (EXAMPLE)

Minimum score	0%
Maximum score	100%
Decline rate/day	100/(total number of days in stage)%
Increase rate/completed event	100/(total number of events in stage)%
Penalty/completed event that is not consistent with 'Marmer stage'	10%

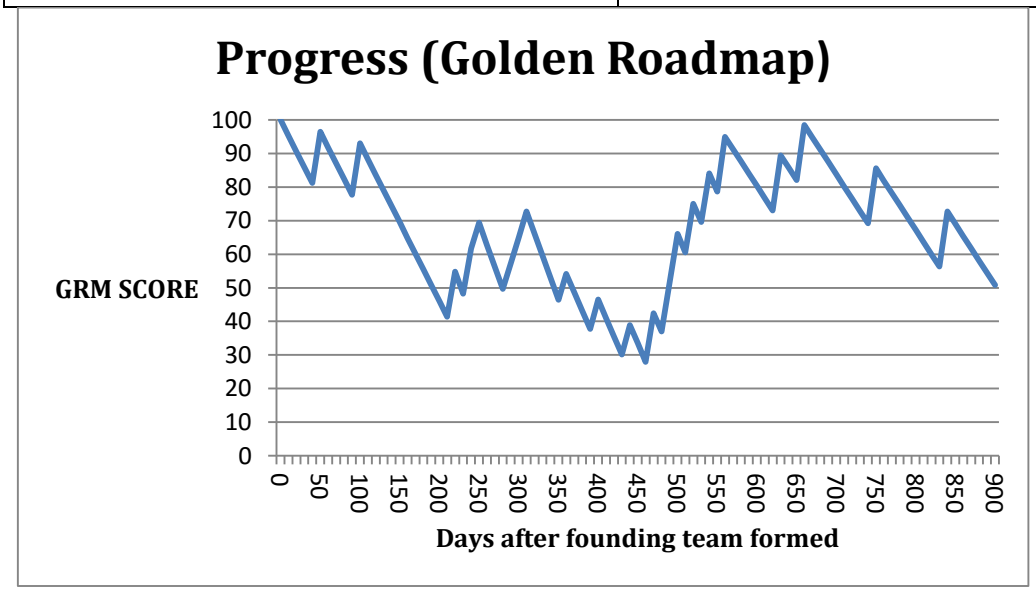


FIGURE 3.4: MONITORING SUCCESSFUL PROGRESS (GOLDEN ROADMAP) (EXAMPLE)

3.3 Contributions of this chapter to the research questions

This chapter has identified what the indicators for the determinants of start-up success are. And methods to quantify or qualify the start-up performance, using these indicators. This chapter aims to present sufficient information to answer the following research question: *What are suitable indicators for these identified determinants – and how can they be measured?*

- The GEC score is an indicator for the determinants of a successful business case. The author suggests that when a business case characteristic has significantly changed a new GEC needs to be done.
- Suitable indicators for the determinants of the successful entrepreneurial team are: customer metrics used for supporting managerial decisions (yes/no), education level of team members, number of years of industry specific experience of team members, number of years of managerial experience of team members, number of prior start-ups, number of founders, (best-practice) mentor (yes/no) and number of hours by founding team. The entrepreneurial team indicators are individually assessed within the GTC. The author suggests that when a team member is removed or added a new GTC needs to be done.
- Suitable indicators for the determinants of successful progress are: time, whether a specific event is completed on the roadmap and consistency with the 'Marmer stage' of the IT start-up. The author suggests to measure progress continuously with the GRM.

TABLE 3.5: DETERMINANTS OF SUCCESSFUL IT START-UP SUCCESS AND INDICATORS

Determinants of a successful business case	**Determinant**	**Indicator**	**Measured with**
	Selecting the right opportunity	#GEC Score	GEC
	The characteristics of the successful business case/opportunity.	#GEC Score	
Determinants of the successful entrepreneurial team	Capability to act on feedback (customer metrics)	The use of customer metrics for supporting managerial decisions	GTC
	Education level	Education level of team member	
	Industry specific experience	Years of specific experience of team member	
	Managerial experience	Years of managerial experience of team member	
	Prior start-up experience	Number of prior start-ups of team member	

	Multiple founders	Number of founders	
	Helpful mentors	(best-practice) Mentors involved with the entrepreneurial team	
	Working long hours (full-time or more)	Number of hours per week by team members	
Determinants of successful progress	Type of event that is completed	Whether a specific event is completed on the roadmap.	GRM
	Time	Time (t) elapsed since start-up.	
	Consistency	Whether the completed event is consistent with the 'Marmer stage' of the IT start-up.	

The determinants and their corresponding indicators that are stated in table 3.5 are used to answer **RQ3** and ultimately will be used to quantify IT start-up performance. However, before it is possible to quantify IT start-up performance, the relative importance of these factors are needed to be determined. The next chapter will address the relative importance of these factors by analyzing data obtained from interviews with entrepreneurship experts.

4. ANALYSIS: DETERMINANTS OF START-UP SUCCESS AND THEIR RELATIVE IMPORTANCE

This project desires to quantify start-up performance. In order to being able to do this, the relative importance of each of the determinants of IT start-up success are needed to be determined first. Interviews with entrepreneurship experts are conducted to obtain relevant data so that the relative importance can be deducted from the data. The methodology used for the data collection is described in section 4.1. Section 4.2 will address the sample size of the data collection. The findings of this research project will be presented in section 4.3. **RQ4**: "*What is the relative importance of these factors that are determinant for IT start-up success from a process perspective?*" is addressing the relative importance of these factors. This question will be answered in section 4.4.

4.1 Data collection

This project has identified which factors are influencing the probability of IT start-up success. But it is not clear yet to which extent these individual determinants are influencing the probability of success. And how to rate the performance on these individual determinants. A method that can be used to determine the value of certain levels of performance are 'utility functions'. With this method one has to rate the individual levels of the scale for their relative contribution. The worst alternative always scores 0 and the best alternative always scores 100.

> For example, for the performance of an IT start-up a bachelor's degree (#4) might be very important, scoring 90, while entrepreneurs with an associate degree (#3) are not so likely to become successful, scoring 40. Entrepreneurs with a master's degree (#5) are the most likely to become successful and is the best alternative, scoring 100. Between level #3 and #4 is a 50 point difference while from level #4 to #5 is only a 10 point difference. Indicating that the step from an associate degree to a bachelor degree is a huge step forward while the difference between a bachelor's degree and a master's degree for the probability of IT start-up success is relatively small.

In order to being able to determine such utility functions, semi-structured interviews with entrepreneurship experts are used. The entrepreneurship experts interviewed for this project are VCs, business developers, one accelerator and successful IT entrepreneurs of ongoing IT start-ups. The individual utility functions are all subjective estimates but the median estimate of a group can be more accurate than estimates of an individual expert (Galton, 1907). This phenomenon called "The wisdom of crowds" is also supported by examples from stock markets,

political elections, and quiz shows (Surowiecki, 2004). That's why this project obtained data so that statistics like median, mean and variance can be used to make conclusion about the relative importance of each of the individual determinants. The relative importance of the determinants are a necessity to quantify IT start-up performance. The conducted interviews are also a resource to identify any shortcomings from the methodologies used.

4.1.1 Questionnaires

In order to be able to obtain relevant information from the interviews, the right questions are needed to be asked. The interviews done with the entrepreneurship experts is a mix of a semi-structured interview with questionnaires. The questionnaires are formulated in such way that SMARTS (Edward & Barron, 1994), a simple multi-attribute utility measurement method, can be used to calculate the weights of the individual determinants. The questionnaire (Appendix II) is structured as follows:

Question 1: The entrepreneurship expert ranks the following entrepreneurial team criteria in order of importance for the success of an IT start-up.

(1) is most important for the performance of an entrepreneurial IT team (8) is least important

TABLE 4.1: QUESTION 1 FROM THE QUESTIONNAIRE

#	Use of customer metrics to support managerial decisions
#	Level of education
#	Industry specific experience
#	Managerial experience
#	Prior start-up experience
#	Multiple founders (more than 1)
#	Helpful mentors
#	Working long hours (full-time or more dedication)

The objective of this question (Table 4.1) is to be able to give the relative importance of the individual entrepreneurial team criteria. With this ranking methodology the entrepreneurship expert is forced to make decisions about the individual importance of the criteria. This is different from the often used methodology: 5-point Likert-scale. Where one could rank every individual criteria as very important (creating less difference between the individual criteria).

Questions 2-7: The scale of the individual entrepreneurial team criteria (level of education, industry specific experience, managerial experience, prior start-up experience, multiple founders, helpful mentors and working long hours) are rated for their utility.

Please rate scale below to utility 0-100.. (0=minimum, 100=maximum) 0 and 100 are both mandatory.

TABLE 4.2: QUESTION 2 FROM THE QUESTIONNAIRE (LEVEL OF EDUCATION (EXAMPLE))

#	Level	Utility (fill in)	#	Level	Utility (fill in)
0	Less than a high-school diploma		**4**	Bachelor's degree	
1	High school diploma		**5**	Master's degree	
2	Some college, no degree		**6**	Professional degree	
3	Associate degree (MBO)		**7**	Doctoral degree	

The objective of the questions 2-7 (example in Table 4.2) is to rate the scale of the individual determinants for utility. This is necessary because the highest level, for example a doctoral degree, is not necessarily the best level for the performance of an IT start-up. And the difference between these individual levels might not be the same. The entrepreneurial team criteria: 'use of customer metrics to support managerial decisions' and 'helpful mentors' do not have their own utility question. This is because yes, the best alternative, is always scoring 100 points and no, the worst alternative, 0 points. These indicators are less accurate.

Question 8: The three categories of determinants (business case, entrepreneurial team and progress) are rated for their contribution to IT start-up success.

Please rate the contribution of the individual criteria towards a prediction for IT start-up success: (Divide 100 points between the 3 criteria, higher number means more important)

TABLE 4.3: QUESTION 8 FROM THE QUESTIONNAIRE

Criteria	Score
Characteristics of the business case	
Characteristics of the entrepreneurial team	
Characteristics of the progress of a start-up	

Finally the last question of the questionnaire (Table 4.3), question 8, the entrepreneurship experts needs to determine the relative importance of the three categories. 100 points can be divided between the three categories. This methodology is chosen above a ranking method like in question 1, because it is relatively easy to divide 100 points between 3 categories in contrast to the 8 categories in question 1.

4.1.2 The semi-structured interview

The questionnaires are a part of the semi-structured interview (Appendix III). At the beginning of the interview attention is dedicated to whether the GEC is a useful tool to assess if an IT business case is likely to become successful or not. When the entrepreneurship expert is not familiar with the GEC the most important investment criteria that the GEC assesses are shown. The interviewee is then asked to identify whether each individual investment criteria are useful criteria to assess if an IT business case is a good business case and whether there are criteria that the interviewee would have expected but are not present. In the next part of the interview the focus is with the entrepreneurial team criteria. Question 1-7 of the questionnaires are going to be answered in this part of the interview. At every question the interviewer asked what a desired level of performance is and whether the individual criteria is a 'knock-out criteria', meaning that if the performance comes below a certain level the entrepreneurship expert thinks that the start-up is doomed to fail. The interviewer will also ask whether there are entrepreneurial team criteria missing that the interviewer would have expected. After the entrepreneurial team questions it is time for addressing the determinants of successful progress. To determine whether the determinants of successful progress are suitable "The Golden Roadmap (Figure 3.3)" is shown and questions are asked about if an event is contributing to IT start-up success. Questions are also asked about if there are events and determinants missing and whether the duration of the stages are likely to be true. The answers of these questions will be contributing to whether the identified determinants and identified indicators are suitable for measuring IT start-up performance. And what the shortcomings from this project are.

4.2 Sample size

In total nine persons have participated in either a semi-structured interview or a questionnaire (usually both, see table 4.4: sample size of this research project). The people interviewed can be categorized between: entrepreneurs, accelerators, VCs and business developers. Only one person participated in an online survey without participating in a semi-structured interview. All participants belong to a specific company (see Table 4.5: participating companies to this research project), the Golden Egg Check B.V had 3 employees participating to the interviews.

TABLE 4.4: SAMPLE SIZE OF THIS RESEARCH PROJECT

	Entrepreneurs	**Accelerator**	**VCs**	**Business developers**	**Totals**
Questionnaire	3	1	2	3	**9**
Semi-structured interview	2	1	2	3	**8**

TABLE 4.5: PARTICIPATING COMPANIES TO THIS RESEARCH PROJECT

Participating company	**Category**
MoneyBird	Entrepreneur
Fortes	Entrepreneur
Niles	Entrepreneur
LLX^2 investments	Accelerator
Value creation and company (VCXC)	VC
Van den ende & Deitmers (Endeit)	VC
Golden Egg Check B.V.	Business developer

Entrepreneurship expertise is obtained from different angles, however the sample size is still relative small. Keep this in mind when analyzing the results in section 4.3.

4.3 Findings

The questionnaires are used to gather information about the relative importance of the identified determinants. Findings from these questionnaires are presented in section 4.3.1 and 4.3.2. The semi-structured interviews are used to identify shortcomings of the methodologies used in this project and whether there are determinants that the participant had expected are missing in this research project. Findings from the semi-structured interviews are presented in section 4.3.3.

4.3.1 Findings from the questionnaires – importance of entrepreneurial team criteria

The first findings are about the relative importance of the entrepreneurial team determinants of IT start-up success (presented in Table 4.6). The participant of the questionnaire is asked to rank the entrepreneurial team determinants as follows: 1 is the most important determinant and 8 is the least important determinant. The observations of individual determinants are collected and combined, rank, mean, median and standard deviation (SD) are presented for all individual determinants.

TABLE 4.6: IMPORTANCE OF ENTREPRENEURIAL TEAM CRITERIA RANKED (1 IS MOST IMPORTANT, 8 IS LEAST IMPORTANT)

Determinants of entrepreneurial team success	**Rank (mean)**	Rank (median)	SD
Prior start-up experience	**1 (2.6)**	1 (2)	1.9
Industry specific experience	2 (3.6)	2 (4)	1.1
Multiple Founders	3 (4.1)	2 (4)	2.8
Use of customer metrics to support managerial decisions	4 (4.3)	2 (4)	2.2
Helpful mentors	5 (5.0)	5 (5)	2.1
Working long hours	5 (5.0)	7 (6)	2.1
Managerial experience	7 (5.7)	5 (5)	2.5
Level of education	**8 (5.8)**	7 (6)	2.2

When analyzing the mean statistics it can been seen that prior start-up experience is ranked as the most important entrepreneurial team criteria and level of education the least important. Also the median statistics confirm this statement.

The relative importance of each of the determinants can be deducted from the results presented in Table 4.6 (This will be further elaborated in the next chapter). But, in order to be able to quantify start-up performance the utility of levels of performance on these determinants are needed to be presented and analyzed first.

4.3.2 Findings from the questionnaires – levels of performance on each individual determinant

Entrepreneurship experts are asked to score the utility (0-100) of different levels of performance on each individual determinant. Utility functions can be deducted from the results of these questions. These (unnormalized) utility functions will be presented in this section. More detailed information can be found in Appendix IV: utility of levels of performance. In this Appendix there are tables of mean, median, standard deviation and 95%-confidence intervals of the individual utility levels of performance.

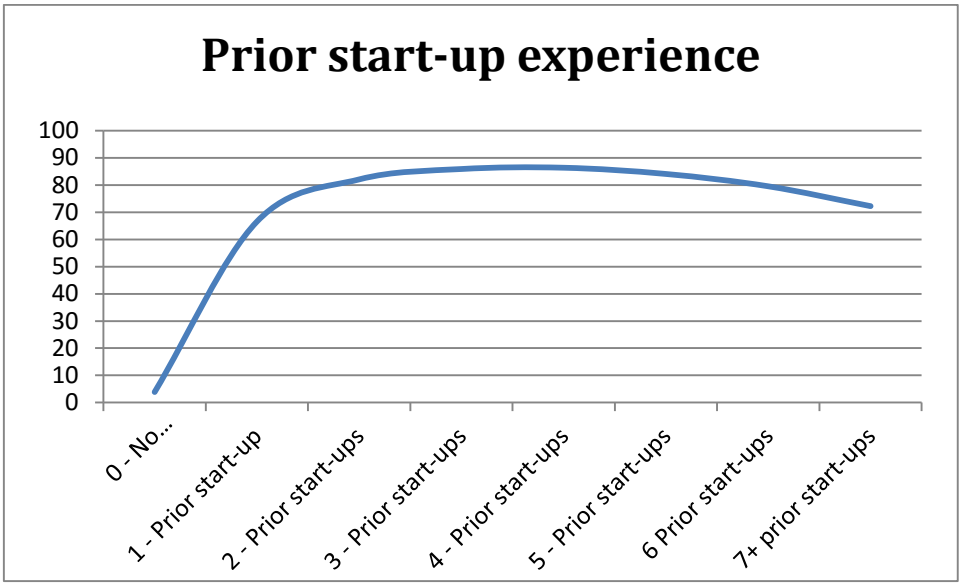


FIGURE 4.1: PRIOR START-UP EXPERIENCE UTILITY FUNCTION

Entrepreneurship experts identified prior start-up experience as the most important criteria for the performance of IT start-ups. The utility function is plotted in Figure 4.2. They identified that four prior start-ups is the best level of performance (utility of 86.3) and no experience as the worst level of performance (utility of 3.9). The step from no experience to 1 prior start-up (utility of 66.5) is a huge leap forward, compared to the step from two prior start-ups (utility of 82.1) to the best level of four prior start-ups (utility of 86.3). The utility function is declining after the fourth prior start-up, indicating that prior start-up experience after the fourth prior start-up decreases the probability that an IT start-up becomes successful. Seven or more prior start-ups (utility of 72.2) scores worse than two prior start-ups (utility of 82.1).

So entrepreneurship experts think that some prior start-up experience has a huge benefit to the probability that an IT start-up will become successful but that too much experience decreases the probability. "*Serial entrepreneurs are not dedicated enough to a single start-up*" or "*serial entrepreneurs are less likely to chase a dream or something they truly believe will change the world*" are some quotes heard during the semi-structured interviews.

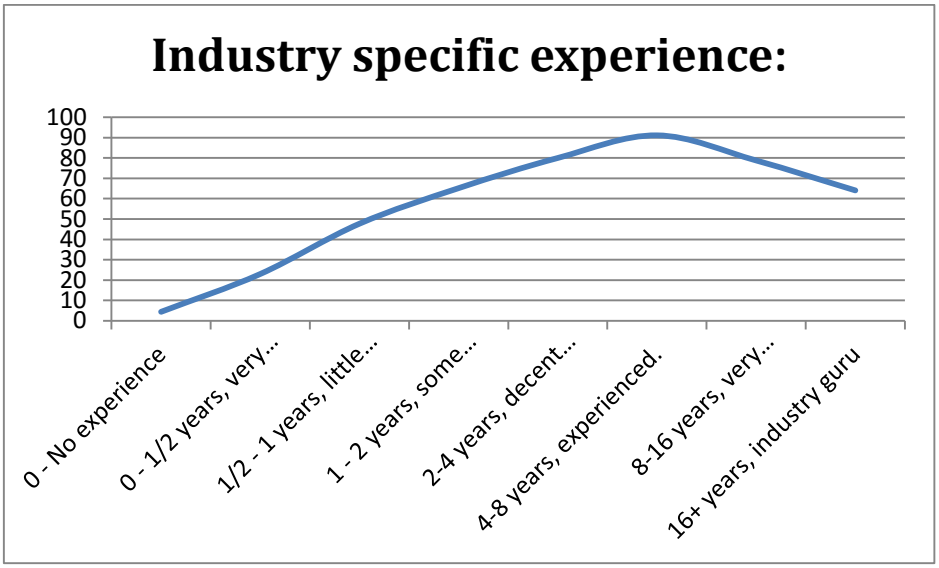


FIGURE 4.2: INDUSTRY SPECIFIC EXPERIENCE UTILITY FUNCTION

Four to eight years of industry specific experience is the most desired level of performance (utility of 91.1), while no experience scores the worst (utility of 4.4). On first sight, the function in Figure 4.3 looks linear, but the scale on the x-axis is logarithmic. After four to eight years of experience the function declines, 16+ years of experience (utility of 64.1) scores worse than one to two years of experience (utility of 65.2).

As is the case with prior start-up experience, some industry specific experience adds a lot of utility while more is not necessarily better. Striking is, when an industry guru is the founder of an IT start-up the probability of IT start-up success is not better than with one to two years of experience. Experts might "*associate being an industry guru with an older person as a founder*" or as being *"crusted in the industry and not being able to 'think outside of the box'"*.

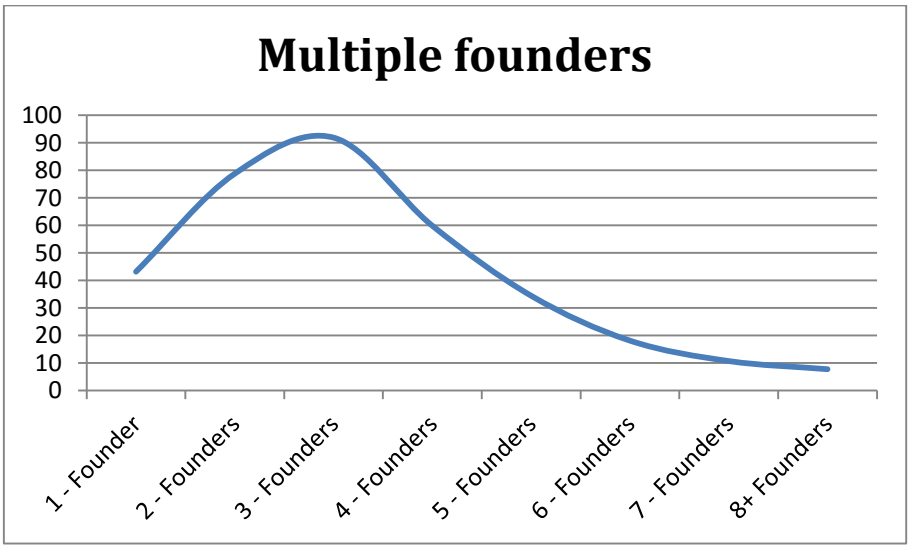


FIGURE 4.3: MULTIPLE FOUNDERS UTILITY FUNCTION

Three founders are regarded as the most optimal founding team size (utility of 91.9), while 8 or more founders is a "*recipe for disaster*" (utility of 7.8). From a single founder start-up (utility of 43.2) to a two founder start-up (utility of 78.8) is the biggest possible improvement while from three founders (utility of 91.9) to four founders (utility of 59.8) is the biggest possible decline. In the end the utility function seems to flatten out.

When looking at the 95%-confidence interval (see Appendix IV) it can been seen that with 95% certainty can be said that 3 founders have higher chances of IT start-up success than one or 4 or more founders. Only the 95%-confidence interval of two founders are crossing the interval of three founders, indicating that with 95% certainty not can be said that three founders have higher probabilities of IT start-up success than two founders.

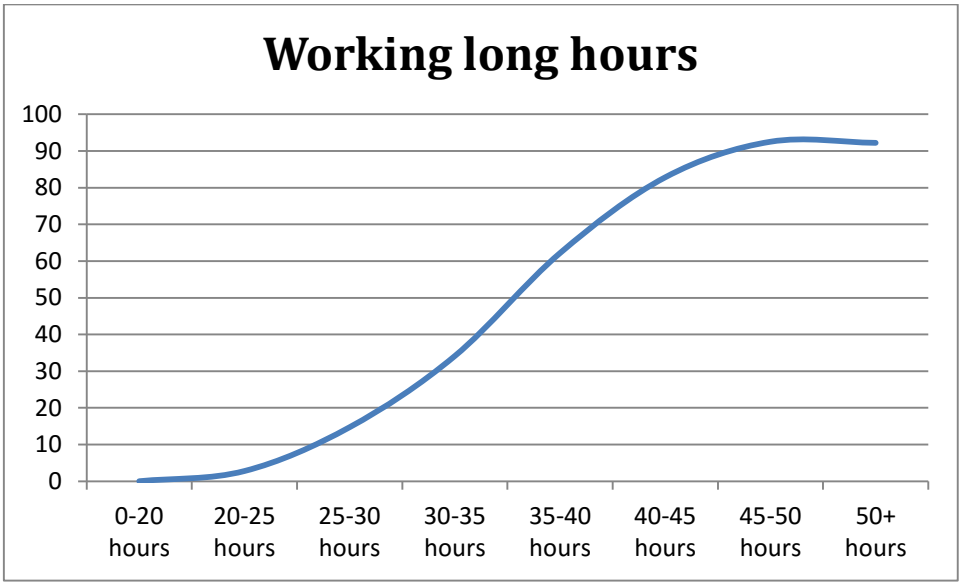


FIGURE 4.4: WORKING LONG HOURS UTILITY FUNCTION

The worst level of performance is the expected 0-20 hours (utility of 0), every single expert rated the 0-20 level an utility of 0. The best level of performance is 45-50 worked hours (utility of 92.5) while not showing a significant difference from the 50+ level (utility of 92.2). Remarkably, the biggest increase in utility is from 30-35 worked hours (utility of 34.1) to 35-40 worked hours (utility of 62.2). This indicates that experts do not believe in founders that are not working full time, and that the added hours in the 35-40 level are more efficient than hours added above 40+ worked hours. With 95%-confidence (see appendix IV) can be said that founders that are working 45+ hours have higher changes to succeed than founders that are working less than 35 hours a week.

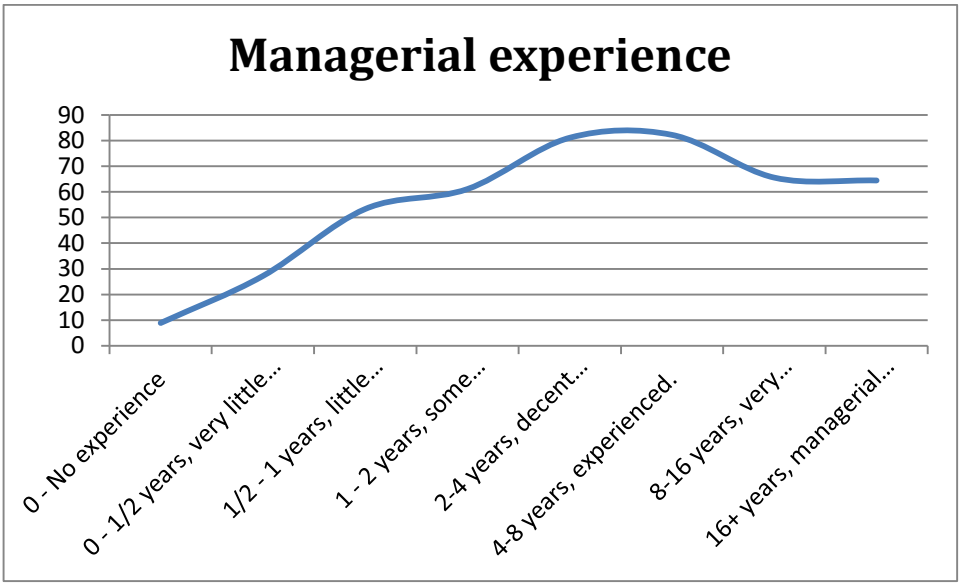


FIGURE 4.5: MANAGERIAL EXPERIENCE UTILITY FUNCTION

Managerial experience has an odd looking utility function. This is also the determinant with the highest standard deviations and the widest 95%-confidence intervals. Experts seems to be uncertain how to rate managerial experience. The worst level of performance is no experience (utility of 3.9), and the best level of performance 4-8 years of managerial experience (utility of 82.2). The biggest increase in utility can be obtained from an increase from 0-½ years of experience (utility of 27.2) towards ½-1 years of experience (utility of 53.3). Some managerial experience helps a lot, but 8-16 years of experience scores worse than 2-4 years of experience.

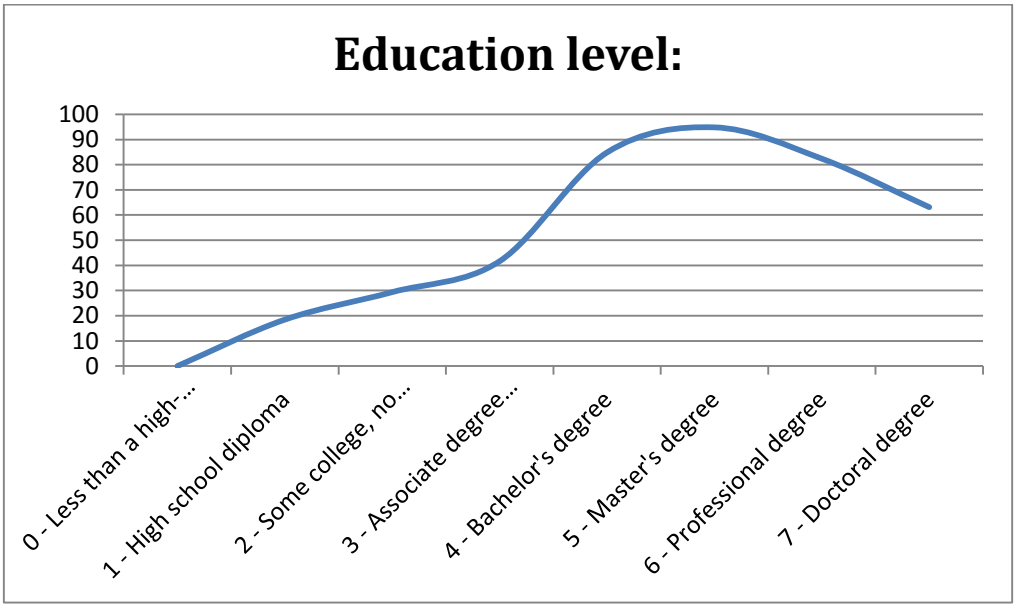


FIGURE 4.6: EDUCATION LEVEL UTILITY FUNCTION

Education level is identified as the level that is contributing the least towards IT start-up success. Every expert rated less than a high-school degree with an utility of 0. A master's degree

is the best alternative (utility of 94.8). The biggest improvement in utility is the step from an associate's degree (utility of 41.7) to a bachelor's degree (utility of 84.9). Striking is that a doctoral degree (utility of 63.1) scores significantly worse than a master's degree. "Entrepreneurs with a doctoral degree are too analytic", "they are not leaving their basements", "they think that their product is never good enough to enter the market" are some quotes from the experts. In fact with a 95%-confidence interval (see Appendix IV) can be said that founders with a master's degree are more likely to become successful than founders with a doctoral degree or less than a bachelor's degree.

4.3.3 Findings from the questionnaires – relative importance of categories of determinants

TABLE 4.7: DETERMINANTS OF IT START-UP SUCCESS AND THEIR CONTRIBUTION (DIVIDE 100 POINTS BETWEEN 3 CATEGORIES)

Determinants	Mean	Median	SD
Of a successful business case	25	25	8.9
Of a successful entrepreneurial team	36.25	40	11.3
Or successful progress	38.75	42.5	13.8

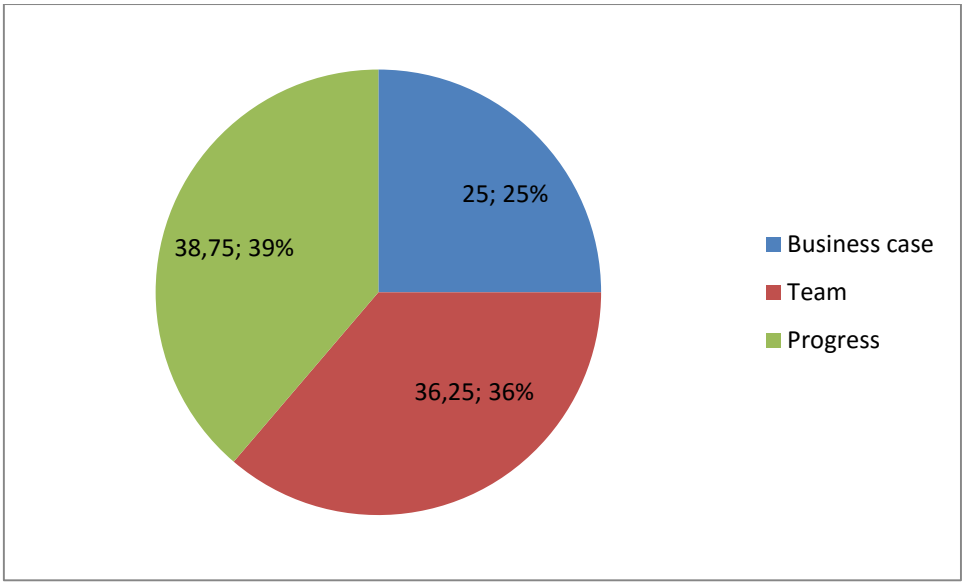


FIGURE 4.7: IMPORTANCE OF THE DETERMINANTSS OF IT START-UP SUCCESS

Finally the last question of the questionnaire addresses the relative importance of the three categories of determinants. When looking at Table 4.7 and Figure 4.7 it can been seen that the determinants of successful progress (GRM) is seen as the most predicative for IT start-up success (39%). While characteristics of the business case (25%) are the least predicative.

4.3.4 Findings from the semi-structured interviews – business case characteristics

When the business case characteristics were discussed, the most important GEC criteria are used as a framework to discuss whether the individual criteria are predicative for IT start-up success. The investment criteria the GEC assesses were indeed often seen as the most important factors to determine whether an IT start-up will become successful.

The entrepreneurship experts did not have many critical notes on the GEC criteria. 'Target market and venture has large growth potential' is identified as an important investment criteria for VCs however, an "*IT start-up could also become successful in a niche*".

The general consensus of the experts was that the GEC is a suitable tool to assess the business case characteristics provided that the 'checker' is someone with know-how of the relevant market and start-up scene. The GEC is a tool that qualitatively assesses criteria, so when an checker has a sufficiently level of know-how it can put the critical notes from above in perspective.

4.3.5 Findings from the semi-structured interviews – entrepreneurial team criteria

The entrepreneurship experts were asked whether the team criteria are all contributing to IT start-up success and whether there are factors missing that they would have expected. They all said that the factors were important and they ranked them accordingly. But, almost every expert said that the biggest shortcoming from the entrepreneurial team criteria used in this research project that the complementarity of the team members is not reflected. "*A huge problem for IT start-ups is that they often have excellent technical employees and/or founders but that they are not able to sell their product, because they are missing excellent sales employees*". It is true that this is not a criteria used for the Golden Team Check so it is not *quantitatively* assessed. However, a GEC criteria is: "The team has complimentary skills and competences" which can be *qualitatively* assessed. Experts also said they would have expected a criteria that assesses whether the entrepreneurial team member has experience with each other. Because it happens often that a recently founded team in reality has no synergy.

These two factors are shortcomings in the model, however it does not mean that the 'golden team check' is not useable at all. Further research needs to be done about these two factors and how they can be used in the GTC .

4.3.6 Findings from the semi-structured interviews – progress characteristics

In this part of the interview, the GRM was shown to the entrepreneurship experts. The interviewee was asked whether each individual event contributed to IT start-up success. Most of the experts said that the financial events (family & friends financing, seed funding and large A-round) are not predicative for IT start-up success. They are only necessary when extra money is needed. All experts said that joining an incubator or accelerator is definitely not necessarily, especially when there are other mentors available. Viral growth is also something that is not happening very often (especially not in business to business) and is not an indicator for IT start-up success per se. All the other events were identified as being important factors. One major factor that kept coming back that is missing from the golden roadmap is pricing model validation. It appears to be a major concern for IT start-ups how to price their product.

In the end of the interview most of the experts were ecstatic about the GRM and said that it is an excellent tool to diagnose whether an IT start-up is progressing.

4.4 Contributions of this chapter to the research questions

This chapter presented how data is collected with the help of questionnaires and semi-structured interviews. Furthermore, the sample size of this research project is stated and with whom the interviews are conducted. Finally the findings of these interviews are presented and analyzed. This chapter aims to present sufficient information to answer **RQ4**: "*What is the relative importance of these factors that are determinant for IT start-up success from a process perspective?* "

This research question is answered with the help of the information that is presented in section 4.3. A summary from this information is stated in Table 4.9. The entrepreneurial team criteria are ranked in Table 4.6. When applying the SMARTS method (Edward & Barron, 1994), weights of the ranked entrepreneurial team criteria can be calculated with the following formula:

If K is the number of attributes then the weight of the *k*th (kth rank) attribute is:

$$w_k = (1/K) \sum_{i=k}^{K} (1/i)$$

*W*hen applying this formula to the ranked entrepreneurial team determinants in Table 4.6, the weights, according to data of this research project, can be determined (see Table 4.8). These weights can be multiplied with the utility score of the performance on an individual determinant in order to generate a total entrepreneurial team score.

TABLE 4.8: RELATIVE IMPORTANCE OF THE FACTORS THAT ARE DETERMINANT FOR IT START-UP SUCCESS

Relative importance of the determinants			
Business case 25%	**Entrepreneurial team** 36%		**Progress** 39%
GEC score 100%	**U(Prior start-up experience)**	33.97%	**GRM score** 100%
	U(Industry specific experience)	21.47%	
	U(Multiple founders)	15.22%	
	U(Use of customer metrics)	11.06%	
	U(Helpful mentors)	6.68%	
	U(Working long hours)	6.68%	
	U(Managerial experience)	3.35%	
	U(Education level)	1.56%	

In the next chapter, the relative importance identified above, will be implemented in a model that is able to quantify IT start-up performance.

5. IMPLEMENTATION: QUANTIFICATION OF START-UP PERFORMANCE

In the previous chapters is identified that IT start-up success from a process perspective is determined by (1) the determinants of a successful business case, (2) the determinants of a successful entrepreneurial team and (3) the determinants of successful business case progress. This research project also identified how to measure these determinants and their relative importance. This information can be used to generate a model to quantify start-up performance. But before the final quantitative model is presented a visual presentation of the process perspective is given in section 5.1. This process perspective is the foundation for the in section 5.2 presented start-up success index.

5.1 Golden Sifter

Before a useful model can be developed, it is necessary to create an understanding of how the determinants, (1), (2) and (3) are related to each other and how these factors are going to be used to monitor start-up performance. A process perspective (see figure 5.1) can be generated with the help of the models stated in section 3.2.1 (Golden Egg Check), 3.2.2 (Golden Team Check) and 3.2.3 (Golden Roadmap).

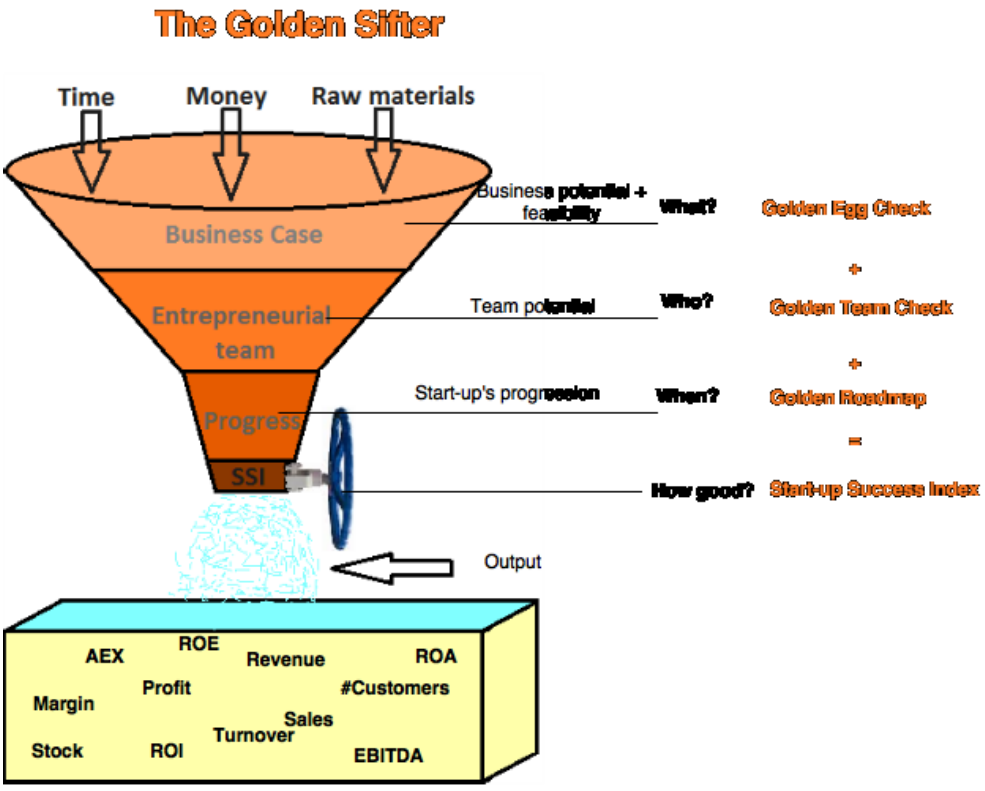


FIGURE 5.1: THE GOLDEN SIFTER

“The Golden Sifter”, referring to the currently available Golden Egg Check, is the name given to this perspective by the author. The Golden Sifter is a metaphor for the ideal entrepreneurial process where waste is left behind or extracted from the inputs. The different layers in The Golden Sifter are representing the process questions: the what, the who and the when; or respectively the business case potential/feasibility check (GEC), the entrepreneurial team check (GTC) and the business progress check (GRM). Every layer questions a different aspect of whether an IT start-up will be successful or not. These layers will reveal where potential waste might occur and why it might occur. At the end of The Golden Sifter is the start-up success index which will be explained in section 5.2. The start-up success index functions as a valve; it is indicative for how well inputs are converted when flowing out of the sifter (outputs). A high number is indicative for inputs that are converted efficiently into outputs, the process is flowing well, without a lot of waste. On the other hand, a low number means that the process is not flowing well, because of inputs that are converted into a lot of waste, instead of the desired outputs.

The Golden Sifter should be a useful tool for predicting if and why waste will occur and whether an IT start-up is likely to become successful or not. Instead of measuring performance with the usual statistic [e.g., profit, ROI, revenue, churn], which are effects; performance is measured from a process perspective which is the cause. These usual statistics are lagging and influenced by chance. Measuring performance based on these statistics is “scoreboard journalism”, referring to the fact that people are caring for results instead of the process of how it is achieved. Of course results are important, but when The Golden Sifter is used to measure start-up performance, waste can be prevented before it occured. And when an entrepreneurial process is both efficient and effective start-up success will be very likely to happen.

5.2 Start-up success index

The start-up success index (SSI) that is already introduced in section 5.1 is the representative quantitative model for IT start-up performance. This index is representative for the factors that are determinant for start-up success; these factors are the business case potential and feasibility (GEC), the entrepreneurial team is an indicator for how well the start-up is exploiting the business case (GTC) and how fast the business case is progressing (GRM). A high number should be indicative for IT start-up success and a low number should be indicative for start-up failure. In other words the number should be a representative prediction of whether an IT start-up firm is likely to be successful or not from a process perspective.

TABLE 5.1: START-UP SUCCESS INDEX

Start-up success index: 0.25 * GECscore + 0.36 * GTCscore + 0.39 * GRMscore			
Business case 25%	**Entrepreneurial team** 36%		**Progress** 39%
GEC score 100%	**GTC score** 100%		**GRM score** 100%
	U(Prior start-up experience)	*33.97%*	
	U(Industry specific experience)	*21.47%*	
	U(Multiple founders)	*15.22%*	
	U(Use of customer metrics)	*11.06%*	
	U(Helpful mentors)	*6.68%*	
	U(Working long hours)	*6.68%*	
	U(Managerial experience)	*3.35%*	
	U(Education level)	*1.56%*	

In chapter 4 is identified what the relative importance of the determinants are (see also Table 5.1). This intelligence can be used to generate the final start-up success index. The start-up success index is built from the three different layers of The Golden Sifter perspective. The GEC score can be used multiplied by the relative importance of the business case determinants. The performance on the entrepreneurial team determinants can be derived from the normalized utility functions and multiplied by the relative importance of the entrepreneurial team determinants. The GRM score can be multiplied by the relative importance of the progress determinants. The following formula can then be created based on the dataset of this research project: SSI = 0.25 * GECscore + 0.36 * GTCscore + 0.39 * GRMscore.

The above created index is an example of how a formula could look like (the current numbers are based upon data obtained from this research project). The author suggests to do more research to obtain a bigger sample size and a continuous learning model (for more information see section 6.3: limitations and recommendations for future research).

6. DISCUSSION

The objective of this research project is to create an quantitative model that is representative for IT start-up performance from a process perspective. This research project identified performance determinants, their relative importance and presented the "Golden Sifter" and the start-up success index (SSI) to quantify IT start-up performance. This chapter presents the answer to the problem statement in section 6.1 and what it has for practical implications in Section 6.2. Also some shortcomings and recommendations for future research are given in Section 6.3.

6.1 Conclusions

The problem statement that this research project aimed to solve is: "*Which factors are determinants for early stage IT start-up success from a process perspective – and what is the relative importance of each of the determinants?*"

A number of determinants were identified with the help of previous literature. Semi-structured interviews with entrepreneurship experts were conducted in order to be able to identify whether the identified determinants from previous research are indeed important for IT start-up success. Instead of comparing the correlation of these determinants with output variables [e.g., profit or revenue], questionnaires were conducted to use the wisdom of the crowd about desired values of these determinants. In order to be able to identify these desired values, entrepreneurship experts had to scale the performance on these determinants for their utility to IT start-up success.

An overview of the most important findings of this research project is presented in Table 6.1 and Table 6.2.

TABLE 6.1: MAIN FINDINGS: RELATIVE IMPORTANCE OF DETERMINANTS

Determinants	**Relative importance for IT start-up success**
Progress determinants	**0.39**
Entrepreneurial team determinants	**0.36**
Business Case determinants	**0.25**

Striking is that the business case determinants are the least predicative for IT start-up success. Some entrepreneurship experts said that "*an excellent business case exploited by a bad entrepreneurial team is doomed to fail while an excellent entrepreneurial team will find a way to*

make the business case work". The most predicative effect for success was attributed to the progress determinants.

In previous research entrepreneurial team criteria are seen as more important to VCs than product and market related investment criteria (business case determinants) (Mensink, 2010). This research shows that entrepreneurial team determinants are indeed seen as the determinants with the most predicative effect for IT start-up success. In conclusion, VCs justifiably assesses the entrepreneurial team criteria as the most important criteria.

TABLE 6.2: MAIN FINDINGS: ENTREPRENEURIAL TEAM DETERMINANTS

Rank (mean)	**Determinants of entrepreneurial team success**	**Level with highest utility**	**Biggest increase in utility**	**Biggest decrease in utility**
1 (2.6)	Prior start-up experience	4 Prior start-ups	No experience to one prior start-up	6 prior start-ups to 7+ prior start-ups
2 (3.6)	Industry specific experience	4-8 years of industry specific experience	0-½years of experience to ½-1 years of experience	8-16 years of experience to 16+ years of experience
3 (4.1)	Multiple Founders	Three founders	From one founder to two founders	From three founders to four founders
4 (4.3)	Use of customer metrics to support managerial decisions			
5 (5.0)	Helpful mentors			
5 (5.0)	Working long hours	45-50 hours a week	From 30-35 hours to 35-40 hours	From 45-50 hours to 50+ hours
7 (5.7)	Managerial experience	4-8 years of managerial experience	0-½years of experience to ½-1 years of experience	4-8 years of experience to 8-16 years of experience
8 (5.8)	Level of education	Master's degree	From an associate degree to a bachelor's degree	From a professional degree to a doctoral degree

Prior start-up experience is seen as the determinant with the most positive effect on IT start-up success by experts while level of education was generally seen as the least important contributor for IT start-up success. All the experience curves showed a very steep utility gain in the beginning while in the end it flattens out. Hence some experience helps a lot while more experience is not necessary better. The ideal levels of performance on these determinants were

not the industry guru level or the managerial guru level. Thus according to these experts having too much experience does exist. People with too much experience might be crusted and might not be able to think outside of the box.

The ideal entrepreneurial team consists of three founders. This research project showed that with 95% confidence can be said that three founders is better than one or four or more founders. The biggest decrease in utility is when a fourth member is added and the biggest possible increase is when one founder seeks an extra founder. The ideal entrepreneurial team works 45-50 hours a week, this is more than the accepted 40 hour workweek but it is generally accepted that entrepreneurs are making more hours than employees. The most effective hours added are in the 35-40 hour interval.

Entrepreneurship experts believe that level of education is the least predicative from the identified factors for IT start-up success. People with a doctoral degree are believed to be significantly worse IT entrepreneurs than people with a master's degree.

Concluding, in a perfect world, the business case of the IT start-ups scores 100% in the GEC, the start-up is founded by three members all with master degrees and each of them works on average 45-50 hours a week. Throughout their careers they obtained 4-8 years of industry specific and managerial experience as well as having experience from 4 prior start-ups. To be able to make the best possible decisions they are making use of customer metrics and have a rich network of helpful mentors. They are completing all the events, that are consistent with their corresponding stages, as the Golden Roadmap suggests and that all within the right time frame.

6.2 Practical implication

6.2.1 For IT start-ups

This research project presented useful information for IT start-ups, for example, the ideal founding team consists of three founders that are working 45-50 hours with a master's degree. So a single founder might want to look for 1 or two extra founders. Especially if these founders bring some extra industry specific and prior start-up experience and a master's degree. The IT start-up entrepreneur can check with the presented start-up success index whether the IT start-up is likely to become successful or not. The entrepreneur can then make adjustments based on the score of the index. When making the correct adjustments the probability that the start-up will become successful will be enhanced.

6.2.2 For consultancy organizations, innovation coaches and venture capitalists

Supporting organizations can also use the start-up success index as a tool to diagnose whether an IT start-up is likely to become successful and whether an (portfolio) organization is making progress. The results of this tool can be analyzed and used as the foundation for coaching or an investment decision. Consultancy can be given based on the identified determinants and their ideal performance levels.

6.2.3 For Golden Egg Check B.V.

Golden Egg Check B.V. can extent their GEC software with an implementation of The Golden Sifter perspective and the Start-up success index. In addition to the already existing GEC, it will add extra checks in the form of the Golden Team Check and the Golden Roadmap. Golden Egg Check B.V. is then able to offer their customers a tool where they can also measure progress with and provide customers with better consultancy.

6.3 Research limitations and recommendations for future research

This research project chose an unconventional approach to identify how performance on individual determinants influences IT start-up success. This research did not do a statistical analysis of how each level of performance correlates with actual output variables like revenue and profit. Instead utility functions of expert opinions were generated by doing questionnaires with entrepreneurship experts. But this unconventional approach was for a reason, early stage IT start-ups often do not have any significant revenue or profit. Revenue and profit are effects, the process of the IT start-up is the cause. That is why this research project chose a process perspective.

But there might be some limitations on this methodology used. The experts based their opinions on their own observations and experiences with IT start-ups. These observations are subjective and experts might have answered the questionnaires with what they thought was beneficial for this research topic. Although entrepreneurship experts from different type of stakeholders were asked to participate in this research project, these experts are all men, from the Netherlands and the sample size is relatively small. Female experts or experts from a different country might have a totally different view on which factors are determinant for IT start-up success.

The determinants that are used in the start-up success index are not all the possible determinants of IT start-up success. For example most experts said that "*complementarity of the founders and their experience together is an important determinant for IT start-up success*", these

determinants are in no way measured in the opted Golden Team Check. Future research can be done for example in the direction of whether an entrepreneurial team is complementary. And whether the entrepreneurial team's experience with each other has a significant influence on IT start-up success. This research project could be a framework for future research, but then with a bigger sample size and/or with another type of industry and/or within another country. The same approach as this research project could be used for any type of industry (e.g., nanotechnology, health care) and in any country.

Further research can be done whether the opted start-up success index is indeed predicative for IT start-up success, investigating it's correlation with different output variables. And how the opted start-up success index could be a continuous learning model. The author suggests to do additional research in the direction of business failure determinants.

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APPENDIX I: VENTURE CAPITALISTS' INVESTMENT CRITERIA (GOLDEN EGG CHECK CRITERIA)

Highlighted criteria: Criteria that the GEC assesses to determine the feasibility and business potential of a business case. These criteria are a selection of the investment criteria that VCs use to assess IT business propositions in the Netherlands, Singapore and Sweden (Mensink, 2010). These criteria are assessed as one of the following options: fully present, somewhat present, not present or unable to assess due to lack of information.

	The Netherlands			Singapore			Sweden		
Criteria	**Mean**	**SD**	**Aver.**	**Mean**	**SD**	**Aver.**	**Mean**	**SD**	**Aver.**
The entrepreneur's personality									
Capable of sustained intense effort	4,17	0,72		4,45	0,52		4,10	0,74	
Able to evaluate and react to risk well	4,25	0,62		4,27	0,65		4,00	0,47	
Ability to articulate well when discussing the venture	3,75	0,75	3,68	4,09	0,83	4,02	3,30	0,82	3,60
Attends to detail	3,55	0,69		3,91	0,30		3,50	0,53	
Has a personality compatible with mine	2,67	0,98		3,36	0,81		3,10	0,88	
The entrepreneur's experience									
Thoroughly familiar with the market targeted by venture	4,50	0,52		4,45	0,69		3,90	0,88	
Demonstrated leadership ability in past	3,50	0,67		3,82	0,60		3,40	0,70	
Has a track record relevant to venture	3,83	0,94	3,45	3,27	0,79	3,47	3,20	1,03	3,20
The entrepreneur was referred to me by a trustworthy source	2,83	1,03		3,09	0,94		2,90	1,20	
I am already familiar with the entrepreneur's reputation	2,58	0,67		2,73	0,47		2,56	1,24	
Characteristics of the product or service and business model									
The product is new, unique, and has substantial innovative content	3,75	0,62		3,55	1,04		3,60	0,97	
A strategy is available to protect the products uniqueness	3,42	0,51	3,69	4,45	0,69	3,75	3,50	0,53	3,41
The product or technology has IP protection	2,92	0,90		3,55	0,82		3,10	0,57	
The technology provides a sustainable competitive edge	4,25	0,75		4,45	0,52		4,40	0,84	

The product is difficult to copy	3,67	0,49		4,09	0,70		3,50	0,53	
The product has an evolving innovation	3,67	0,78		3,82	0,60		3,20	0,92	
The product has a disruptive innovation	3,17	1,11		3,64	0,67		2,89	0,93	
The technology is scalable	4,67	0,49		4,64	0,50		3,90	0,74	
The technology is proven and validated	3,83	0,83		3,45	1,04		3,30	0,48	
The product has been developed to the point of a functioning prototype	4,17	0,83		3,55	1,29		3,60	1,26	
The product is ready to market or has short time to market	4,08	1,00		3,55	1,04		3,90	0,88	
The product can be adopted by customers without a significant behavioural change	3,67	0,65		3,55	0,82		3,80	0,42	
The product enjoys demonstrated market acceptance	3,67	0,89		3,36	1,12		3,10	0,57	
The product solves a painful problem of a customer	4,25	0,62		4,00	0,63		4,00	0,67	
The product is involved in the core business of the customer	3,50	1,00		3,36	0,81		2,60	0,84	
The product is easy to understand and communicate	3,42	0,90		3,91	0,70		3,30	0,67	
The product performance is superior to competitors' products	4,08	0,79		3,82	0,75		3,60	0,70	
The product is consistent with corporate strategy of my company	2,83	0,83		3,18	1,25		2,60	1,07	
The product is resistant to economic cycles	3,00	0,63		3,27	0,65		2,80	0,63	
Characteristics of the market									
The target market is clear and can be defined	3,92	0,67		4,36	0,67		3,89	0,60	
The entrepreneur can demonstrate a market demand	4,67	0,65		4,27	0,79		4,22	0,44	
The entrepreneur can demonstrate a market gap	3,55	0,82		3,91	0,70		3,33	1,00	
The venture is in a dynamic, disruptive market with attractive patterns	3,33	0,98	3,66	3,73	0,79	3,70	3,00	0,87	3,49
The target market has a large growth potential	4,67	0,49		4,45	0,52		3,78	0,83	
The implied growth rate between the ventures' size today and in 3-5 years is realistic	4,33	0,49		4,00	0,89		4,22	0,67	
The venture has a large growth potential	4,58	0,51		4,45	0,69		4,22	0,67	
There is a large total available market	4,50	0,67		4,27	0,65		4,11	0,33	
The total available market can be benchmarked for an accurate prediction of the size	3,33	0,65		3,55	0,52		3,33	0,50	

The venture is able to (know how to) defend their market in 2-3 years	3,83	0,39	4,09	0,70	3,78	0,67
There is little threat of competition during the first 2-3 years	2,83	0,39	3,09	1,04	2,89	0,78
The product has the competitive advantage to be no. 1 or 2 in the market	3,83	0,72	3,91	0,54	3,56	0,73
An attractive position and/ or large potential market share can be claimed in the market	4,00	0,74	4,09	0,70	3,44	0,73
The product is scalable across geographies and has international potential	4,25	0,97	4,36	0,81	4,00	0,71
The venture can use its customer's international network to enter new markets	3,33	0,65	3,36	0,81	3,00	0,50
(Uncertain) political factors do/ will not interfere the market	3,17	0,94	3,09	0,54	3,44	0,73
The entrepreneurs' vision on market growth is not too underestimated	3,27	1,01	3,55	0,69	3,44	1,01
The entrepreneurs' vision on market growth is not too overestimated	3,45	1,04	3,55	0,93	3,00	0,71
Competitors are present and known	3,50	1,17	3,55	1,04	3,22	0,97
Customers are known and/ or there are already some customers	4,00	0,74	3,36	1,03	3,89	0,93
I get good referrals from customers/ professionals/ competitors/ other VCs about the venture	3,50	0,90	3,36	0,81	3,67	1,00
The venture has relations with stakeholders (customers/ service providers/networks)	3,50	1,08	3,50	0,85	3,75	0,89
The venture enjoys a first mover advantage	3,08	0,67	3,18	0,75	2,67	1,00
The venture is able to maintain their first mover advantage	3,42	0,67	3,60	0,84	3,11	1,17
The venture choose the most attractive position in the value chain	3,58	0,67	3,55	0,52	3,56	0,73
The venture found a niche market	2,64	0,92	3,18	0,87	3,22	0,83
The product is different than the trend in the market	1,92	0,79	2,82	1,08	2,13	1,25
The product is conform the trend in the market	2,83	1,11	3,00	0,94	2,63	0,92
Barriers to entry should not be too difficult for the venture	3,00	1,28	3,10	0,88	3,13	0,83
The venture will stimulate an existing market	3,00	0,85	3,09	0,70	3,43	0,98
The venture will create a new market	2,33	0,78	2,91	0,70	2,38	0,92

The venture will transform the market	2,75	0,62		3,27	0,79		2,50	1,20	
The venture is in an industry with which I am familiar	4,00	1,10		3,36	1,21		3,00	0,50	
The product has a strong value proposition for a specific target market	4,58	0,67		4,27	1,01		4,22	0,83	
The value proposition is different from competitors	3,92	0,67		4,00	0,89		3,56	0,88	
The value proposition provides barriers to entry	3,50	0,80		3,82	0,60		3,89	0,33	
The value proposition fits in the value chain	3,64	0,81		4,18	0,60		3,78	0,67	
The product is a 'must have' or 'need to have'	4,33	0,98		3,91	0,83		3,89	0,78	
People will pay for the product	4,64	0,50		4,27	1,01		4,22	1,30	
The revenue model is proven in small scale	4,08	0,67		3,36	1,03		3,78	0,83	
The revenue model is proven internationally	2,83	0,72		2,91	0,70		3,11	0,93	
The revenue model is attractive	4,42	0,51		4,45	0,52		4,11	0,78	
The revenue models adds value	4,45	0,52		4,09	0,70		3,67	1,22	
The revenue model is scalable	4,83	0,39		4,55	0,52		3,89	0,78	
Financial considerations									
I require a return equal to at least 10 times my investment within 5-10 years*	4,08	0,90		4,00	0,89		3,56	1,01	
I require an investment that can be easily made liquid (e.g., taken public or acquired)	3,17	1,11	3,56	3,91	0,70	3,82	3,78	0,97	3,37
I require a return equal to at least 10 times my investment within at least 5 years	3,42	0,67		3,55	0,82		2,78	0,83	

*The GEC assesses: I require a return equal to at least *7* times my investment within 5-10 years.

The Golden Egg Check also assesses criteria that are not from Mensink's research:

- The team has complimentary skills and competences.
- There is a good organization in place that can support the team.
- The venture is not highly dependent on a small number of customers.
- The venture is not highly dependent on a small number of suppliers.
- Alliances or partners are present that adds value to venture.
- The venture aims at further development of the product or technology.
- Assumptions with respect to costs are realistic and well defined.
- Assumptions with respect to revenue are realistic and well defined.
- A realistic exit strategy (buyout, IPO) can be defined.

APPENDIX II: QUESTIONNAIRES

1) Can you put the following entrepreneurial team criteria in order of importance:

(1) is most important for the performance of an entrepreneurial IT team (8) is least important

#	Use of customer metrics to support managerial decisions
#	Level of education
#	Industry specific experience
#	Managerial experience
#	Prior start-up experience
#	Multiple founders (more than 1)
#	Helpful mentors
#	Working long hours (full-time or more dedication)

2) **Education level:**

Please rate scale below to utility: 0-100.. (0=min, 100=max)

#	Level	Utility (fill in)	#	Level	Utility (fill in)
0	Less than a high-school diploma		**4**	Bachelor's degree	
1	High school diploma		**5**	Master's degree	
2	Some college, no degree		**6**	Professional degree	
3	Associate degree (MBO)		**7**	Doctoral degree	

3) **Industry specific experience:**

Please rate scale below to utility: 0-100.. (0=min, 100=max)

Years	Level	Utility (fill in)	Years	Level	Utility (fill in)
0	No experience		**2-4**	Decent amount of experience	
0-½	Very little experience		**4-8**	Experienced	
½-1	Little experience		**8-16**	Very experienced	
1-2	Some experience		**16+**	Industry guru	

4) **Managerial experience**

Please rate scale below to utility: 0-100.. (0=min, 100=max)

Years	Level	Utility (fill in)	Years	Level	Utility (fill in)
0	No experience		**2-4**	Decent amount of experience	
0-½	Very little experience		**4-8**	Experienced	
½-1	Little experience		**8-16**	Very experienced	
1-2	Some experience		**16+**	Managerial guru	

5) **Prior start-up experience**
Please rate scale below to utility: 0-100.. (0=min, 100=max)

#	Level	Utility (fill in)	#	Level	Utility (fill in)
0	No experience		**4**	Prior start-ups	
1	Prior start-up		**5**	Prior start-ups	
2	Prior start-ups		**6**	Prior start-ups	
3	Prior start-ups		**7+**	Prior start-ups	

6) **Multiple founders**
Please rate scale below to utility: 0-100.. (0=min, 100=max)

#	Level	Utility (fill in)	#	Level	Utility (fill in)
1	Founder		**5**	Founders	
2	Founders		**6**	Founders	
3	Founders		**7**	Founders	
4	Founders		**8+**	Founders	

7) **Working long hours**
Please rate scale below to utility: 0-100.. (0=min, 100=max)

#	Level	Utility (fill in)	#	Level	Utility (fill in)
0-20	Avg. hours per week		**35-40**	Avg. hours per week	
20-25	Avg. hours per week		**40-45**	Avg. hours per week	
25-30	Avg. hours per week		**45-50**	Avg. hours per week	
30-35	Avg. hours per week		**50+**	Avg. hours per week	

8) Importance: business case – team – progress

Please rate the contribution of the individual criteria towards a prediction for IT start-up success: (Divide 100 points between the 3 criteria, higher number means more important)

Criteria	Score
Characteristics of the business case	
Characteristics of the entrepreneurial team	
Characteristics of the progress of a start-up	

APPENDIX III INTERVIEW GUIDE

Welkom bij het interview,

Allereerst wil ik zeggen dat het interview in het Nederlands zal verlopen hoewel veel begrippen in het Engels zullen zijn. Uiteraard kan ik bij enig ontstane verwarring toelichting geven op deze begrippen. Mijn scriptie is in het Engels en om de resultaten bruikbaar te maken zullen de invuloefeningen ook in het Engels zijn. Het interview zal ongeveer anderhalf uur duren. Heeft u er bezwaar bij dat het interview zal worden opgenomen? Het is enkel voor eigen gebruik, en zo kan ik mijn aandacht voldoende bij het gesprek houden i.p.v. notulen te maken.

*** Start opname**

Met behulp van literatuur onderzoek is bepaald welke factoren een bijdragen hebben aan het succes van een (IT) start-up vanuit een procesperspectief. Deze factoren komen uit drie categorieën: eigenschappen van de business case (product en markt), eigenschappen van het ondernemersteam (bijvoorbeeld opleidingsniveau en industrie specifieke ervaring) en eigenschappen van de voortgang van een business case (welke events heeft het bedrijf doorlopen).

Vaak is het zo met deze factoren dat het is vastgesteld dat een factor een positieve of negatieve bijdrage heeft voor de prestaties van een ondernemersteam, maar het is niet duidelijk wat gewenste hoogtes zijn en of bijvoorbeeld 20 jaar ervaring significant beter is dan bijvoorbeeld 25 jaar ervaring. Daarom probeer ik met behulp van interviews met o.a. investeerders, ondernemers en wetenschappers een soort “wisdom of the crowd” te verkrijgen over gewenste hoogtes van deze factoren.

Ook heeft het onderzoek een roadmap vastgesteld met fases en bijbehorende events (bijvoorbeeld, minimum viable product, eerste betalende klant en wederkerende klanten) die typerend zijn voor bijna elke IT Start-ups. Deze roadmap kan behulpzaam zijn voor het monitoren van de progressie van een start-up. Het interview zal ook gebruikt worden voor de validatie van deze roadmap (welke events missen er? draagt een bepaald event wel bij of niet bij aan het succes van een start-up etc.).

Graag zou ik uw mening/kennis willen horen over wat u nou denkt dat cruciaal is voor het succes van een start-up en welke van de geïdentificeerde factoren juist wel of juist niet bepalend zijn.

Business case assessment:

Allereerst gaan we het hebben over de karakteristieken van een business case. Dit zijn karakteristieken dat o.a. het product, de markt en de technologie betreft van een onderneming of onderneming in wording.

1: Golden Egg Check: Bent u bekend met de Golden Egg Check en het gebruik van deze tool? (Nee, ga verder naar vraag 2).

Zo ja: Vind u de Golden Egg Check een bruikbare tool om te bepalen of een IT business opportunity een goede business case is?

Een business opportunity is een kans om te een vraag vanuit de markt te behoeven door het leveren van een product dat toegevoegde waarde heeft en wat ontstaan is uit een creatieve combinatie van grondstoffen.

- Wat mis je, of wat zijn de tekortkomingen van de Golden Egg Check voor het bepalen of een business case een business case is die succesvol kan worden? (het gaat hier niet om gebruiksissues)

2. De golden Egg Check is gebaseerd op investeringscriteria die Venture Capitalists uit Singapore, Zweden en Nederland gebruiken tijdens het beoordelen van een business case. De belangrijkste criteria die naar voren kwamen uit het onderzoek van Thomas Mensink zijn gegeven in Appendix 1. Wilt u Appendix 1 even voor u nemen en de criteria even doornemen?

Vind u deze criteria bepalend voor het succes van een IT startup? (we kunnen ze even 1 voor 1 aflopen)

Mist er volgens u een belangrijk criteria waar u erg op let?

Zijn er voor u duidelijke tekortkomingen wanneer deze criteria worden gebruikt om te bepalen of een IT bedrijf succesvol zou kunnen worden of niet?

Entrepreneurial team assessment

3. Ook het ondernemers team is bepalend voor het succes van een IT start-up. De volgende 9 vragen gaan over eigenschappen van het ondernemersteam. Op het blad voor u heeft u bij de eerste **invultabel** een lijst met 8 criteria die belangrijk zijn voor de kans of een IT start-up succesvol wordt of niet. Wilt u deze 8 criteria bestuderen en vervolgens op volgorde zette van

mate waarin u deze belangrijk acht voor het behalen van IT start-up succes. 1 is het meest belangrijke criteria en 8 dus het minst belangrijke criteria.

(1) is most important for the performance of an entrepreneurial IT team (8) is least important

#	Use of customer metrics to support managerial decisions
#	Level of education
#	Industry specific experience
#	Managerial experience
#	Prior start-up experience
#	Multiple founders (more than 1)
#	Helpful mentors
#	Working long hours (full-time or more dedication)

4. Als u nog even terug gaat naar de lijst die u net heeft gezien. Zijn er in deze lijst criteria die u wel had verwacht maar die er niet instaan?

5. Denk u dat de criteria in deze lijst allemaal bepalend zijn voor het behalen van IT start-up succes of niet?

6. Education level Als er een ondernemersteam naar u toekomt en u krijgt de vraag om een inschatting te maken over de succeskansen van dit ondernemersteam. Het gaat hierbij weer om een ondernemersteam achter een IT start-up.

Wat zou voor u gemiddeld opleidingsniveau zijn van het ondernemersteam dat u graag zou willen zien?

Vind u dat het opleidingsniveau een afvalcriteria is? D.w.z. dat als er bijvoorbeeld een ondernemingsteam met een heel laag opleidingsniveau naar u toekomt dat u er geen vertrouwen in heeft? Of zou u ongeacht het opleidingsniveau het toch een kans geven zolang de rest maar goed is?

Zou u nu willen kijken naar invultabel 2 . U wordt geacht de volgende opleidingsniveaus een cijfer te geven volgens een nutfunctie. D.w.z. U geeft het een cijfer waarin een bepaald opleidingsniveau volgens u gevoel bijdrage heeft voor het succes van een IT start-up. Het slechtste alternatief krijgt automatisch een 0, en het beste alternatief krijgt automatisch een 100. Het zou bijvoorbeeld kunnen zijn dat u weinig verschil vind tussen een bepaald niveau van opleiding en dat deze dus hetzelfde, of ongeveer hetzelfde scoren maar dat u wel heel graag een

minimum opleidingsnivau ziet. Het hoogste opleidingsniveau hoeft ook niet persee het beste te zijn, het kan zijn dat u vindt dat deze juist niet goed is voor het succes van een IT start-up.

Please rate scale below to utility: 0-100.. (0=min, 100=max)

#	Level	Utility (fill in)	#	Level	Utility (fill in)
0	Less than a high-school diploma		**4**	Bachelor's degree	
1	High school diploma		**5**	Master's degree	
2	Some college, no degree		**6**	Professional degree	
3	Associate degree (MBO)		**7**	Doctoral degree	

7. Industry specific experience Dit is hetzelfde type vraag als de vorige vraag. Er is dus weer een ondernemers team naar u toekomt om een inschatting te maken voor de succeskansen van dit IT start-up team.

Wat zou u voor een gemiddeld industrie specifieke ervaringsniveau zien?

Vind u dat Industrie specifieke ervaringsniveau een afval criteria is?

Zou u nu willen kijken naar invultabel 3?

Years	Level	Utility (fill in)	Years	Level	Utility (fill in)
0	No experience		**2-4**	Decent amount of experience	
0-½	Very little experience		**4-8**	Experienced	
½-1	Little experience		**8-16**	Very experienced	
1-2	Some experience		**16+**	Industry guru	

8. Managerial experience Dit is hetzelfde type vraag als de vorige vraag. Er is dus weer een ondernemers team naar u toekomt om een inschatting te maken voor de succeskansen van dit IT start-up team.

Wat zou u voor een gemiddeld managementervaringsniveau zien?

Vind u dat managementervaringsniveau zien een afval criteria is?

Zou u nu willen kijken naar invultabel 4?

Years	Level	Utility (fill in)	Years	Level	Utility (fill in)
0	No experience		**2-4**	Decent amount of experience	
0-½	Very little experience		**4-8**	Experienced	
½-1	Little experience		**8-16**	Very experienced	
1-2	Some experience		**16+**	Managerial guru	

9. Prior start-up experience Dit is hetzelfde type vraag als de vorige vraag. Er is dus weer een ondernemers team naar u toekomt om een inschatting te maken voor de succeskansen van dit IT start-up team.

Wat zou u voor een gemiddeld ervaringsniveau met voorgaande start-ups zien?

Vind u dat ervaringsniveau met voorgaande start-ups een afval criteria is?

Zou u nu willen kijken naar invultabel 5?

#	Level	Utility (fill in)	#	Level	Utility (fill in)
0	No experience		**4**	Prior start-ups	
1	Prior start-up		**5**	Prior start-ups	
2	Prior start-ups		**6**	Prior start-ups	
3	Prior start-ups		**7+**	Prior start-ups	

10. Multiple founders Dit is hetzelfde type vraag als de vorige vraag. Er is dus weer een ondernemers team naar u toekomt om een inschatting te maken voor de succeskansen van dit IT start-up team.

Wat zou u voor een gemiddeld aantal oprichters zien?

Vind u dat het aantal oprichters een afval criteria is?

Zou u nu willen kijken naar invultabel 6?

#	Level	Utility (fill in)	#	Level	Utility (fill in)
1	Founder		**5**	Founders	
2	Founders		**6**	Founders	
3	Founders		**7**	Founders	
4	Founders		**8+**	Founders	

11. Working long hours Dit is hetzelfde type vraag als de vorige vraag. Er is dus weer een ondernemers team naar u toekomt om een inschatting te maken voor de succeskansen van dit IT start-up team.

Wat zou u voor een gemiddeld aantal werkuren per week van de oprichters zien?

Vind u dat het gemiddeld aantal werkuren per week van de oprichters een afval criteria is?

Zou u nu willen kijken naar invultabel 7?

#	Level	Utility (fill in)	#	Level	Utility (fill in)
0-20	Avg. hours per week		**35-40**	Avg. hours per week	
20-25	Avg. hours per week		**40-45**	Avg. hours per week	
25-30	Avg. hours per week		**45-50**	Avg. hours per week	
30-35	Avg. hours per week		**50+**	Avg. hours per week	

Progress

12. Roadmap we gaan nu kijken naar de gecreëerde roadmap in Appendix 2. Dit is een lijst met events en de bijbehorende fases en gem. tijd die voor deze fases nodig zijn om af te ronden. We gaan deze events even 1 voor 1 door en het is aan u om te bepalen of een event bijdraagt aan het succes van een IT start-up.

Mist u events voor een IT start-up die u wel had verwacht?

Vind u de tijdschaal voor de fases een realistische aanname voor IT start-ups?

13. We zijn nu bijna klaar, ik vraag u enkel om te kijken naar **invultabel 8**. Zou u daarin aan willen geven hoe belangrijk u de 3 criteria vindt voor het succes van een IT start-up? U heeft 100 punten te verdelen tussen de 3 criteria.

Criteria	**Score**
Characteristics of the business case	
Characteristics of the entrepreneurial team	
Characteristics of the progress of a start-up	

Bedankt voor het interview!

APPENDIX IV: UTILITY OF LEVELS OF PERFORMANCE

Prior start-up experience				
Level	**Mean**	**Median**	**SD**	**95%-confidence interval**
0 – No experience	3.9	0	11.7	0 – 11.5
1 – 1 Prior start-up	66.5	54.5	30.1	46.9 – 86.2
2 – 2 Prior start-ups	82.1	90	24.8	65.9 – 98.2
3 – 3 Prior start-ups	85.9	90	18.6	73.7 – 98.0
4 – 4 Prior start-ups	86.3	90	16.4	75.6 – 97.1
5 – 5 Prior start-ups	84.0	100	22.5	69.3 – 98.7
6 – 6 Prior start-ups	79.5	90	32.3	58.4 – 100
7 – 7+ Prior start-ups	72.2	70	33.5	50.4 – 94.1

Industry Specific Experience				
Level	**Mean**	**Median**	**SD**	**95%-confidence interval**
0 – No experience	4.4	0	13.3	0 – 13.2
1 – 0 - ½ years of exp.	23.0	10	21.6	8.9 – 37.2
2 – ½ - 1 years of exp.	47.7	44.4	29.8	28.2- 67.2
3 – 1 – 2 years of exp.	65.2	66.7	22.9	50.2 – 80.2
4 – 2 – 4 years of exp.	80.0	80	19.4	67.3 – 92.7
5 – 4 – 8 years of exp.	91.1	100	15.4	81.1 – 100
6 – 8 – 16 years of exp	78.8	90	31.0	58.5 -99.0
7 – 16+ years of exp.	64.1	70	36.4	40.3 – 87.8

Multiple founders				
Level	**Mean**	**Median**	**SD**	**95%-confidence interval**
0 – 1 Founder	43.2	50	36.1	19.6 – 66.8
1 – 2 Founders	78.8	85.7	25.2	62.3 – 95.3
2 – 3 Founders	91.9	100	16.3	81.2 – 100
3 – 4 Founders	59.8	50	24.7	43.7 – 76.0
4 – 5 Founders	34.4	30	35.4	11.3 – 57.6
5 – 6 Founders	18.1	10	25.9	1.2 – 35.1
6 – 7 Founders	10.7	0	21.5	0 – 24.8
7 – 8+ Founders	7.8	0	23.3	0 – 23.0

Working long hours				
Level	**Mean**	**Median**	**SD**	**95%-confidence interval**
0 – 0-20 hours p. week	0	0	0	0 – 0
1 – 20-25 hours p. week	2.8	0	6.7	0 – 7.1
2 – 25-30 hours p. week	14.7	0	20	1.6 – 27.8
3 – 30-35 hours p. week	34.1	25	30.1	14.5 – 53.8
4 – 35-40 hours p. week	62.2	60	24.2	46.4 – 78.0
5 – 40-45 hours p. week	82.8	90	18.8	70.6 – 95.1
6 – 45-50 hours p. week	92.5	100	11.3	85.2 – 99.9
7 – 50+ hours p. week	92.2	100	10.9	85.1 – 99.4

Managerial experience				
Level	**Mean**	**Median**	**SD**	**95%-confidence interval**
0 – No experience	8.9	0	26.7	0 – 26.3
1 – 0 - ½ years of exp.	27.2	10	33.5	5.4 – 49.1
2 – ½ - 1 years of exp.	53.3	50	33.2	31.7 – 75.0
3 – 1 – 2 years of exp.	61.1	60	23.7	45.6 – 76.6
4 – 2 – 4 years of exp.	81.1	100	26.2	64.0 – 98.2
5 – 4 – 8 years of exp.	82.2	90	25.9	65.3 – 99.1
6 – 8 – 16 years of exp.	65.6	80	38.4	40.4 – 90.7
7 – 16+ years of exp.	64.4	70	39.4	38.7 – 90.2

Education level				
Level	**Mean**	**Median**	**SD**	**95%-confidence interval**
0 – Less than a high school diploma	0	0	0	0 – 0
1 – High school diploma	18.5	10	22.9	3.5 – 33.4
2 – Some college, no degree	29.4	10	32.8	8.0 – 50.8
3 – Associate's degree	41.7	30.8	24.6	25.5 – 57.7
4 – Bachelor's degree	84.9	80	16.2	74.3 – 95.4
5 – Master's degree	94.8	100	8.3	89.4 – 100
6 – Professional's degree	82.4	80	19.0	70.0 – 94.8
7 – Doctoral degree	63.1	67	27.7	45.0 – 81.3

APPENDIX V: SCOPUS SEARCH STRATEGY

Topic	Refinement	Number of hits
"Performance index"		19,555
	Entrepreneur	14
	Success + Start-up	3
"Business Success"		1,641
	Monitor	54
	Monitor + Entrepreneur	27
	Prediction + Start-up	11
	Definition	41
Start-up + success		988
	Determinants	94
	Determinants + entrepreneur	76
	Determinants + entrepreneur + measure	31
"Human capital"	Determinants + start-up + entrepreneur	43
Start-up + survival + entrepreneur		98
	Determinants	46
Entrepreneur + performance + indicator		75
	Start-up	19
Start-up + satisfaction		200
	Determinants	14
"Entrepreneurial team"		171
	Start-up + performance	57

Sorted on cited or date.