Guidelines for success: employing project management techniques to increase business start-up survival

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Declaration

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Abstract

Small to medium enterprises are a vital part of the global economy yet have a high rate of failure, especially during the start-up phase. While research has explored the variety of causes which could lead to start-up business failure, very little to no research has been done on potential techniques which could increase the rate of success of start-up businesses. This study aims to be an initial exploration of the possibility that the use of project management techniques could influence the chances that a start-up business could succeed. A comparison of the causes of failure and environments of projects and start-up businesses is used to draw an analogy between the two. This allows for the consideration that start-up businesses could be treated as a special type of project, and that project management techniques could be applied to impact the success of start-up businesses. While success is difficult to quantify and evaluate, in this context it refers to survival of the business to the point of stability.

The literature review showed that projects and start-up businesses were similar enough to allow for the above analogy to hold. A research questionnaire was then used to determine the possible existence of trends between the use of project management techniques and business success. Analysis of the collected data showed a potential trend between the use of project management techniques and start-up business success. The results indicated that the use of project management techniques positively influenced the chance of start-up business success. On this basis it is recommended that checklists, communication plans, contingency plans, cost baselines, analogous estimates, lessons learned documents, and to a lesser extent, milestone analysis and work breakdown structures be used by entrepreneurs. Further research into a wider range of techniques as well as the effectiveness of the techniques is required.

Keywords: START-UP BUSINESSES, PROJECT MANAGEMENT TECHNIQUES, SMALL TO MEDIUM ENTERPRISES, BUSINESS SUCCESS

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PMT – Project Management Technique

SME – Small to Medium Enterprise

SUB – Start-up Business

UK – United Kingdom

1 Introduction and Overview

1.1 Global Contribution of Small and Medium Enterprises

Small and medium enterprises (SMEs) are a vital part of the economy of every country and the global economy as a whole, as well as being a major driving force of economic growth (Soininen, Puumalainen and Sjögrén, 2012; Nikolić, Jovanović, Mihajlović and Schulte, 2018). Small and medium enterprises have been found to constitute an increasing portion of most countries' economies and have the ability to compete on a global level (Muhammad, Char, Yasoa' and Hassan, 2010; Cressy and Bonnet, 2018). The increase in SMEs can be attributed to the expansion, internationalisation and reduced costs of international logistical companies, as well as the reduced costs of sourcing basic goods through these international corporations (Muhammad, et al., 2010; Nikolić, et al., 2018). Advances in global trade and capital flow could allow SMEs to focus on manufacture and marketing, rather than attempt to do more than they are capable of.

In addition, there are challenges which could reduce the ability for SMEs to be successful in the global marketplace (Nikolić, et al., 2018). Some of the obstacles which inhibit the competitiveness of small and medium enterprises in the global business environment include heavier impacts of global recessions and market fluctuations, an increased demand with a lagging supply, increased costs from importation taxes and duties, insufficient scale of managerial experience and lack of finances to maintain a competitive edge in the global market (Muhammad, et al., 2010). Despite these hindrances there is an increasing number of SMEs entering the international business market (Soininen, et al., 2012; Cressy and Bonnet, 2018).

In 2016, it was estimated that SMEs accounted for 43.5% of global employment rates (Aysan, Disli, Ng and Ozturk, 2016). Small and medium enterprises, in many countries, also represent the largest portion of their country's job creation (Aysan, et al., 2016). While these figures could be considered skewed by developing countries, this is not

the case. In the United Kingdom (UK), over 99% of businesses are SME's, with 96% being micro-businesses, employing fewer than 10 people, yet still accounting for approximately a third of the employment rate of the entire United Kingdom (Rhodes, 2014; Merchant Savvy, 2020). Rhodes (2014) states that in 2013 there were, annually, approximately 350 000 new businesses being started in the UK, and roughly 240 000 businesses failing, and that the trend showed an increase in both of these figures. In 2018 the number of new businesses in the UK was only around 381 000 while the number of failed businesses was 336 000 (Merchant Savvy, 2020). The literature shows an extremely large amount of start-up businesses (SUBs) being established and a huge portion of them being unsuccessful.

In the United States of America less than 50% of small businesses survive for 5 years (Dautovic, 2019). The failure of such a large portion of SUBs has a major impact on the stability of an economy and affects multiple parties, including the employer, employees, the local community and the investors (Lussier and Halabi, 2010). Less developed countries also rely on small and medium enterprises, but especially in the creation of new SMEs through start-up businesses (Naudé, 2010). The rate of new start-up businesses (per capita) is higher in developing countries, such as India, Malaysia and South Africa, than in developed countries, such as the United Kingdom, Finland and the United States (Naudé, 2010).

The rate of new SUBs is higher in developing countries and the resources for these SUBs are abundant (Naudé, 2010). There is also a much higher failure rate for SUBs in developing countries (Naudé, 2010; Lussier and Halabi, 2010). While some of these could be explained by factors external to the business environment (such as natural disasters, political influences and violent conflicts), there are developing countries which are not exposed to these factors which still display similar failure rates (Naudé, 2010).

In a developing country, such as South Africa, other factors should be explored and considered. If the effect of the factors affecting the failure rate of start-up businesses in South Africa can be decreased, it could lead to the survival of more start-up

businesses. These SUBs might then become stable SMEs, contributing and strengthening the economy.

1.2 Small and Medium Enterprises in South Africa

In countries which are less developed than their first world counterparts, like South Africa and other African countries, SMEs and their inception through SUBs play a larger role in the overall economy of their resident country (Smit and Watkins, 2012). The major economic influences of SMEs and SUBs in the South African economy are through job creation and the promotion of economic growth (Smit and Watkins, 2012). The job creation and economic growth brought about by SMEs is a major and vital influence, as an estimated 90% of recognised and registered businesses in South Africa are micro, small and medium enterprises, and therefore SMEs are some of the biggest contributors to the South African economy (Smit and Watkins, 2012). These small and medium enterprises represent roughly 55% of all jobs in South Africa (Van Scheers, 2011).

In a developing country such as South Africa, small and medium enterprise start-ups have more advantages than in developed first world countries (Van Scheers, 2011; Lussier and Halabi, 2010). Marketing strategies can be more effective and reach a larger potential client base, which have not yet been cornered by established larger firms (Van Scheers, 2011). Governments are also more willing to develop programmes to support start-up businesses in order to increase the growth of that country's economy (Smit and Watkins, 2012). New infrastructure is being established in less developed countries, this offers the opportunity for start-up SMEs to develop strategies to take advantage of these infrastructures from the outset and develop innovative solutions which could give a competitive advantage (Hotho and Champion, 2011).

The South African business environment can be hostile towards start-up businesses, especially those developed by immigrants and women (Crush, Chikanda and Skinner, 2015). Women are approximately 50% less likely to be involved in business creation

in South Africa (Garwe and Fatoki, 2012). Female-owned start-ups are also more likely to fail than their male-owned counterparts, this is seemingly due to a lack of availability of external funds (Garwe and Fatoki, 2012). The two types of external funds are debt financing and investments, the latter being largely unavailable to SMEs in South Africa (Garwe and Fatoki, 2012).

Start-up SMEs contribute to roughly 75% of new job creation in South Africa, and although this may seem high, it lags behind the 80% achieved by Asian companies and other African countries in which small and medium enterprises comprise a much higher percentage of employment and economic growth (Smit and Watkins, 2012). The relatively low figure could be due to the myriad of obstacles faced in the South African business environment, including a lack of marketing skills, financial issues, a lack of legal knowledge, the non-growth orientated structure of the businesses and their unwillingness to expand (Smit and Watkins, 2012), or a lack of support from external sources (Van Scheers, 2011; Mazanai and Fatoki, 2011; Mboyane and Ladzani, 2011; Abor and Quartey, 2010; Cant and Wiid, 2013).

The failures of such a large portion of the economy of South Africa are not limited to job creation. The rate that new SMEs are being started is also one of the lowest in the world and still declining (Fatoki, 2014). The low rate of creation of start-up businesses is made more alarming when coupled with the statistic that the South African failure rate of small and medium enterprises is approximately 80% (Fatoki, 2014). The SME sector has been designated as the target sector for government initiatives to increase economic growth since the early 2000s and the failures of the sector reveal a definite need for improvement (Smit and Watkins, 2012).

1.3 Project Management

Another area of the business environment which has historically had a very high failure rate is the development and management of projects (Meredith and Mantel, 2012). A project can be defined as an endeavour with a limited timeframe which results in a

singular goal, product or service (Meredith and Mantel, 2012). Project management is therefore the process and techniques which allow this endeavour to be successful, not only through the achievement of the goal of the project but also by achieving the goal within the constraints of the project. With projects, there are three constraints which are cited repeatedly, namely, cost, time and scope (Meredith and Mantel, 2012; Ebbesen and Hope, 2013).

Research has been conducted in an attempt to expand the three core constraints of projects to include other measures, such as changing expectations, or scope creep (Burke, 2014), or to adapt to more modern business requirements such as sustainability (Ebbesen and Hope, 2013). The expansion of these core constraints helps to highlight core principles that could be part of the driving forces behind success in project management; adaptability and constant improvement of project management techniques.

The purpose of project management is to facilitate the completion of the project successfully; that is achieve the goal of the project to the satisfaction of all the stakeholders within the constraints of the project design (Meredith and Mantel, 2012). The facilitation of completion is achieved through a variety of techniques which have been developed by experienced project managers, and improved through research, to increase project quality. The use of project management techniques and tools have steadily been increasing for many years (Mir and Pinnington, 2014), as has the research into project management (Mir and Pinnington, 2014).

The research in project management has been focussed largely on the determination of factors which increase the success of projects (Alias, Zawawi, Yusof and Aris, 2014; Mir and Pinnington, 2014), how project management techniques have affected project success (Mir and Pinnington, 2014); or the reasons that projects have failed (Anthopoulos, Reddick, Giannakidou and Mavris, 2015; Batool and Abbas, 2017; Lundmark, 2017). The primary purpose of the research done in project management is to improve project management techniques by minimising failures, increasing the factors that promote success and assess the overall quality and impact of the

developed project management techniques (Meredith and Mantel, 2012; Mir and Pinnington, 2014).

In the world of project management, many techniques have been developed and refined over a span of years in order to address common issues and danger areas in the planning and execution of project goals (Burke, 2014). If project management is handled with careful consideration of the indigenous cultural environment in which it is conducted (Hotho and Champion, 2011), the techniques developed through many years of experienced project management (Radujković and Sjekavica, 2017; Mir and Pinnington, 2014), have been shown to increase the chances of project success dramatically (Radujković and Sjekavica, 2017).

The nature of a project; a small undertaking with specific goals, guided by a larger corporation, which could be pursuing multiple projects concurrently or over its lifespan, can allow for the development of these techniques. The environment; being able to learn from multiple iterations of similar situations, is the essence of learning through experience (Lile and Kelemen, 2014).

1.4 Projects and Start-Up SMEs

The environment in which projects operate is defined by constraints and limitations (Meredith and Mantel, 2012). Unless a project is vital to the functioning of an organisation, projects are chosen based on how one or more forms of gain to the organisation outweigh the costs to the organisation (Meredith and Mantel, 2012). The comparative gain of the projects is expressed in the form of profit vs loss, and while there are many forms of this calculation, they are very similar (Burke, 2014). In order for an enterprise to survive, the overall gain or profit must exceed the overall costs; if this is not true the company can become mired in debt and eventually become bankrupt and fail. The requirement that profit be greater than cost is true of large firms and small and medium enterprises.

For the chosen projects remain to profitable, there are constraints and limitations imposed on them. Budgets, timeframes, amount of work hours and access to specialised labour are common constraints experienced by project managers (Meredith and Mantel, 2012). The great struggle of project managers is to maintain the project quality while operating within these constraints, while being disrupted by external circumstances such as delays in deliveries, unexpected costs, and unavailable skilled labour at crucial times (Burke, 2014).

It is possible to draw quite a few similarities between the environment of a project and the environment in which small and medium enterprises are created. A start-up SME is very commonly limited financially and should be created with a budget in mind as it is highly uncommon for start-ups to have access to external equity or unlimited capital outlay (Garwe and Fatoki, 2012). While the business is being started it is also unlikely to start generating income, and most entrepreneurs will not have another source of income and will be living off their savings during this period. The lack of initial income creates a pseudo timeline in which the business needs to generate income; before the living costs overcome the savings being used. The budget of start-up businesses also usually reduces the amount of external labour that can be hired during the start-up phase and the access to specialised skilled workers. Entrepreneurs must triumph over these constraints while being disrupted by the same external obstacles as those faced by project managers.

As can be seen when comparing Figure 1 and Figure 2, the life cycle of a project is remarkably similar to the life cycle of a business, from launch to the start of the maturity phase. If we analogise starting a new SME as a project with the completed project being a mature and stable business, the overlap of sales to project completion could be seen as a natural progression. The juxtaposition of life cycles along with the environmental similarities discussed above could support the notion of managing the start-up of a business as a special type of project. Especially as this definition of a start-up business fits perfectly with the definition of a project referenced at the start of this section.

If a start-up business can be approached as a special type of project, there may be certain techniques, developed by the project management discipline, which could help entrepreneurs avoid failure. Even if the techniques are not “cookie-cutter” solutions for SUBs in South Africa, the techniques might be able to be developed and refined in order to better suit them.

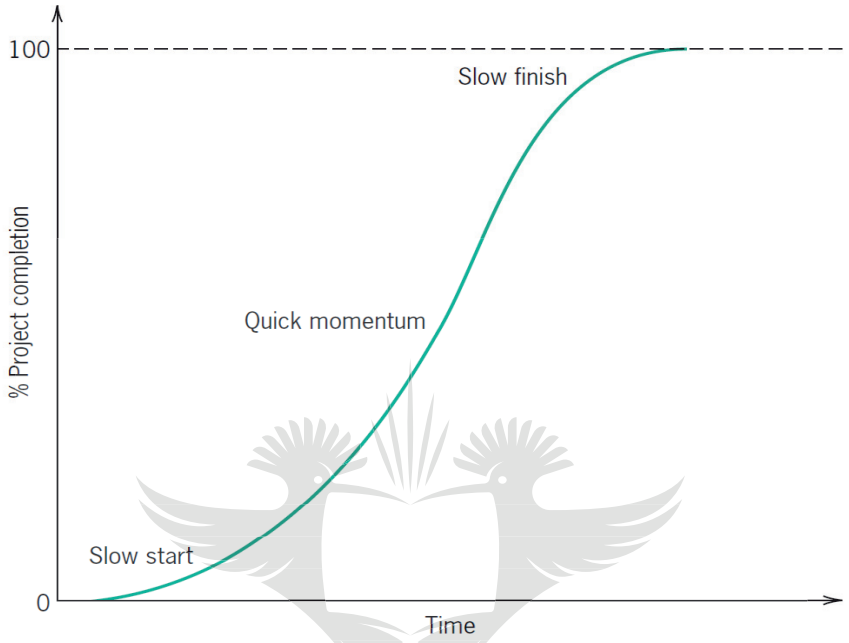

Figure 1*: Project life cycle graph (Meredith and Mantel, 2012, p. 18)*

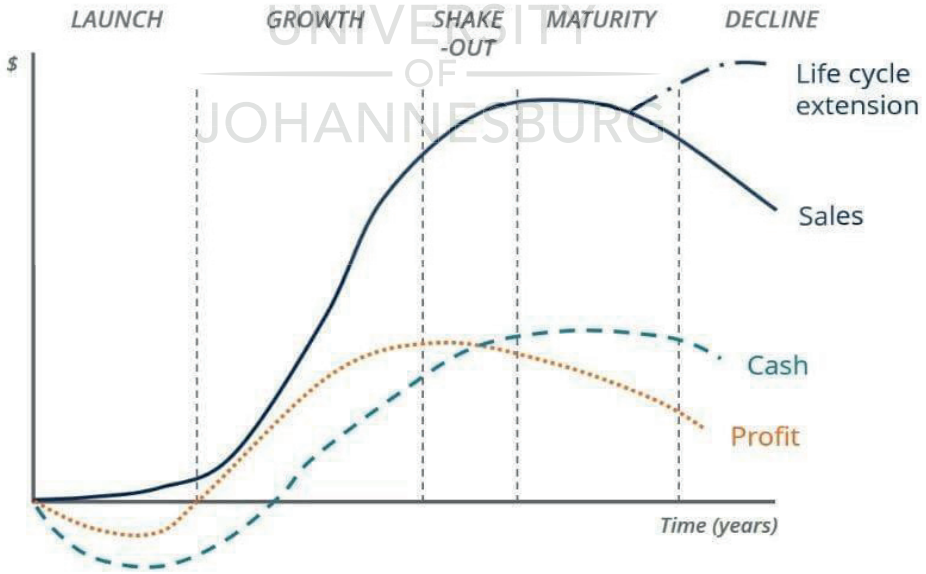

Figure 2: Business life cycle graph (CFI, 2019)

1.5 Success vs Failure

Failure is extremely common among small businesses and start-ups (Nemaenzhe, 2010), with research reporting that even in developed countries, approximately 50% are failing within the first four years (Lussier and Halabi, 2010), with up to 90% failing or showing signs of inevitable failure within ten years (Lussier and Halabi, 2010; Van Scheers, 2011).

The lack of success of small businesses can be attributed to a multitude of reasons (Nemaenzhe, 2010). Many of the common causes leading to the failure of a business could be said to be stemming from a single origin, namely, inexperience (Miralles-Marcelo, del Miralles-Quirós and Lisboa, 2014). It is through experience that a manager or owner could be able to avoid the common pitfalls and mistakes which result in such a high percentage of businesses failing to survive beyond the start-up phase.

However, before the causes of failure can be identified, the failure itself must be identified. The identification of failure requires a definition of failure; however, failure is not easily identified (Lehtinen, Mäntylä, Vanhanen, Itkonen and Lassenius, 2014). Firstly, there are different types of failure; a venture can be said to have failed if it was not started, delayed, abandoned, did not meet client specifications or bring a return on investment (García-Quevedo, Segarra-Blasco and Teruel, 2014; Anthopoulos, et al., 2015). The determination of failure also depends on the view-point (Lehtinen, et al., 2014), for example the client could be satisfied with a project, however the organisation could declare it a failure as it brought no benefits to the parent organisation.

It should also be considered that a failure is not always a negative decision (García-Quevedo, et al., 2014), abandoning a project for a more monetarily efficient project is a good decision or abandoning a project while in financial crisis could allow an organisation to remain viable as a whole (García-Quevedo, et al., 2014).

Through the literature review performed for this research, it was found that the bulk of research focusses on failures and their causes while comparatively fewer have been dedicated to defining criteria for success in project management and start-up businesses. Despite this, focus has been gradually shifted, for a significant period of time already, from more traditional measures of success such as cost, profit and long-term survival (Ebbesen and Hope, 2013) to more holistic and human-centered measures, such as environmental impact, sustainability, job creation, stakeholder satisfaction and public benefit (Ebbesen and Hope, 2013).

For the purpose of this study, success shall be defined as survival of the business beyond the start-up phase; this phase can last different lengths for each individual business, however, for this research it is defined as four years, in order to include the slower-starting companies. The definition of success includes small businesses that have been consolidated into larger corporations, for reasons other than imminent failure.

1.6 Start-up Businesses

The different phases of business growth are often divided into stages. The first stage is the development, inception or creation phase (Nemaenzhe, 2010); the entrepreneur decides to implement a new idea or innovation in the form of a business. The second stage is the start-up or survival stage, in this stage critical decisions business plans are made and implemented (Burke and Cowling, 2015). These decisions and plans could have a large impact on the success of the business. After the start-up phase the business, if it has survived, experiences a growth phase; the product or service is being more and more widely used (Nemaenzhe, 2010). Finally, without further innovation or market shifts, the business experiences maturity and perhaps decline (Nemaenzhe, 2010).

Start-up businesses are businesses which are in the infancy of their growth cycle (Burke and Cowling, 2015). The start-up stage occurs after the inception of an idea for

a business and the determination of the entrepreneur to create the business. The start-up stage of business growth is where a large proportion of businesses fail (Koellinger and Thurik, 2012). For the context of this paper a start-up business is independent of a larger corporation.

1.7 Problem Statement

The environment of start-up businesses is typified through constraints which the entrepreneur must navigate in order to develop the business. These constraints are found in deficiencies of finance, managerial experience and skills (García-Quevedo, et al., 2014; Burke and Cowling, 2015).

Due to the humble beginnings of most start-up businesses, there is a lack of initial funds or capital (Paschen, 2017). The lack of resources could necessitate the attainment of a loan or require the use of investors (García-Quevedo, et al., 2014). Skilled labour is usually not readily available in the workforce, and if it is required it is often hired or borrowed temporarily (Burke and Cowling, 2015).

Start-up and small businesses have a very high rate of failure, in research this is reportedly 50% within the first four years in developed countries (Lussier and Halabi, 2010). And reportedly as high as 80% in the first two years in South Africa (Garwe and Fatoki, 2012).

To increase the success of future start-up businesses, start-up businesses are compared to projects with similar environments and constraints as start-up businesses. The causes of failure of projects and documented start-up businesses are compared and analysed. Thereafter an attempt is made to determine project management practices and principles which would improve the chances of success for start-up businesses. Finally, the chosen techniques are critiqued in order to determine what, if any, changes or adjustments would be recommended to tailor them to start-up businesses.

1.8 Objectives

Start-up businesses developing into successful small and medium enterprises is essential to the creation of jobs and growth of the economy in any country, including South Africa. The failure rate of start-up businesses is extremely high and any attempt to curtail the failure of these businesses is a worthwhile activity. Project management has developed techniques which reduce the risk of failure in projects and if a start-up business could be approached as a special type of project, perhaps some of these techniques could help to improve the rate of success experienced by start-up businesses.

The following objectives were chosen for this research paper:

- Analysis of the frequent causes of failure in projects and determining if there are comparative causes evident in documented cases of start-up business failures.
- Compilation and adjustment of project management techniques which would increase the potential for success of start-up businesses.

The objectives were chosen in an attempt to improve the number of surviving start-up businesses which in turn might improve job markets and provide a more stable platform for innovative and smaller companies to grow.

While actual experience is indispensable and extremely valuable, this paper could provide techniques, which have been proven to be effective in project management and adapted to suit the environment of a start-up business, to inexperienced business managers or owners to increase the survival chances of start-up businesses. The use of the pseudo experience could then allow for a less hazardous gain of real-world experience while making safer business decisions in areas where experience might be initially lacking.

1.9 Research Questions

In order to build and refine techniques adapted from project management, it must first be established that small and medium enterprise start-ups are similar. At least similar enough to assume that the techniques developed by project management would be of benefit to the success rate of SME start-ups. After this, the techniques and principles that would be beneficial to SME start-ups must be selected from amongst the myriad of project management techniques which have been developed. In order to do this and achieve the research objectives above, the study will be guided through the following questions which are at the heart of the purpose of this study:

- How are failures of start-up businesses similar to failures of projects?
- Which project management techniques could help improve start-up business success?

The answers to the above research questions will hopefully allow SMEs in South Africa and globally to become more successful. These questions will be answered through a research process in order to utilise all the effort of previous researchers and combine the gathered knowledge in order to extract conclusions which could be helpful to current and future entrepreneurs.

1.10 Literature Review Process

1.10.1 Introduction

This section presents the overall literature research processes and design for this study, including the methodology of research for each of the major literature reviews, as well as the scope for this study. A small discussion on the ethics requirements for this minor dissertation is also included.

1.10.2 Literature Research Design

Research design denotes the encompassing concept of how the various components integrate and conform to the research questions in a logical and cogent means, in order to ensure that the argument presented is effective. In other words, the research design is a map of the method for collecting, analysing and arranging the collected information to increase its efficacy (Maxwell, 2013). The research design for this paper can be broken down into 3 sections; collection, analysis, arrangement, as shown in Figure 3.

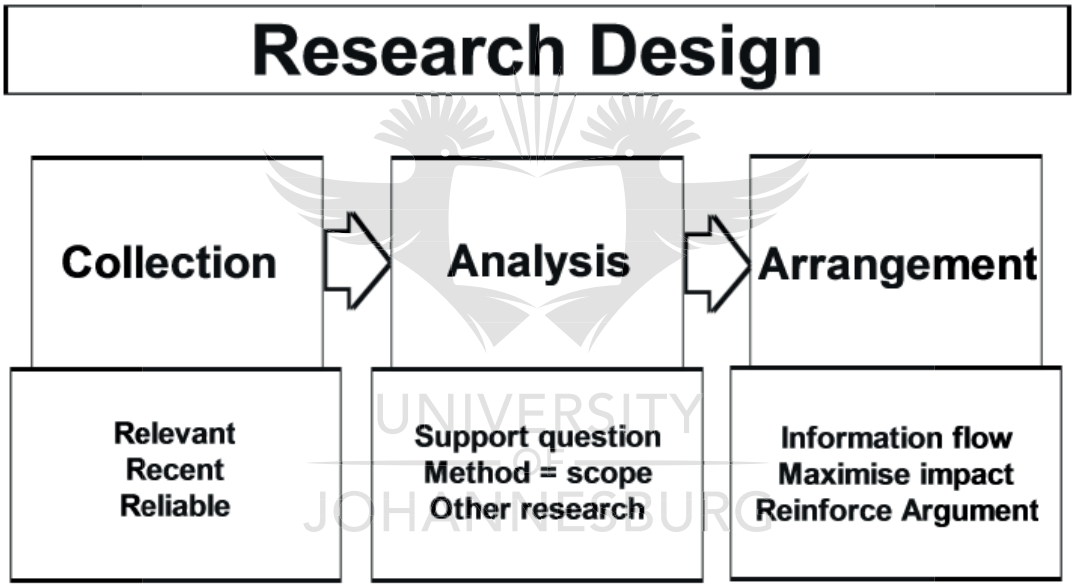

Figure 3: *Research design visualised*

As reflected in Figure 3, the collection of appropriate research material requires that the research be relevant – applicable to the literature study, recent – contain information that can be applied in the current time frame, and, reliable – comes from sources which are credible and have academic merit. The analysis of the research in this study examines if the research supports the underlying research questions. Also, if the method of data collection in the research corresponds with the scope of this paper and determines if other relevant research is attached which could corroborate the findings. Arranging the collected and analysed research involves examining the

flow of information throughout each of the literature studies and maximising the impact of the results of the research. The maximisation of the impact is performed in order to reinforce the argument which supports the underlying research questions.

1.10.3 Method

The objectives, as stated in Chapter 1, will be accomplished through literary research in order to evaluate the common causes of failure in projects and start-up businesses. The environments of projects and start-up businesses are then compared in order to determine if any project management techniques might be applied to start-up businesses in order to combat the high rate of failure. After the environments of projects and start-up businesses have been determined, project management techniques can be selected which could improve the survival of start-up businesses. The penultimate step is to consider adaptations to the chosen techniques, through the comparison of environments, to better suit start-up businesses. Finally, further recommendations and a conclusion is provided.

The literature review is compiled into three chapters. Project failures – an exploration into the common failures experienced in projects as well as the reported causes. Start-up business failures – the stated causes of failure of start-up businesses in literature. Lastly, start-up business and project environments – a description of the environments in which projects and start-up businesses are conducted, with comparative analysis. These literature chapters are then followed by a chapter on project management techniques.

The project management techniques were chosen according to two criteria. Firstly, the technique must have been effective in solving a cause of failure in the project environment. Secondly, the failure cause must have a corresponding cause in the start-up business environment.

Subsequently, the chosen techniques were considered in terms of whether there were any modifications to the techniques that could be made to perhaps increase the

effectiveness when applied to start-up businesses. In the final chapter, further recommendations with regards to targeted future research, technique development and analysis were presented. It was then followed by a summary of the final results and concluding remarks.

1.10.4 Scope of Literature Review

1.10.4.1 Project Failure Causes

The causes of project failure are often recorded and investigated in literature and many sources of information on project failure exist (Lehtinen, et al., 2014). Sources which examined multiple projects and included hypotheses surrounding the cause and links between causes are used more extensively to increase the amount of data found in each paper. The size and complexity of the projects are not under consideration, merely the root causes of the failure. Also, due to the abundance of research and the rapidly improving field of project management, only recent sources which discuss project failures (from the last five years) are considered in order to keep the information relevant.

Research is focussed on sources which handled multiple projects and focussed on the reasons for the failure of projects. The majority of reported failures are from a software background (Lehtinen, et al., 2014) and therefore these contributed to a large portion of the consulted sources. However, the causes for software project failure are not isolated to digital projects and they can be commonly found in more traditional projects (Lehtinen, et al., 2014). Also, as the modern world becomes more computerised, more and more projects are including software or digital components and it is for this reason that developments and failure causes in software projects should not be ignored by other organisations.

The majority of literature on project failure focusses on specific causes which resulted in failure (Lehtinen, et al., 2014), therefore, a short study into causal links has been included in the literature studied, and the findings of that study are briefly conferred.

1.10.4.2 Start-up Business Failures

Alarmingly, 80% of South African start-up business fail in the first two years (Garwe and Fatoki, 2012) and approximately 50% of start-up businesses fail in developed countries in the first four years (Lussier and Halabi, 2010). South African business failure rates climb to 90% in the first four years (Van Scheers, 2011), therefore, it seems logical that the start-up phase of SMEs are a crucial phase to target for increasing the survival of SMEs. Therefore, research that focuses on the reasons that businesses failed in the start-up phase, and more specifically, in the first four years, will be sourced for this study.

Not all causes of SUBs' failure are preventable, some are due to completely unavoidable external factors (Fatoki, 2014). Violent conflicts suddenly arising, natural disasters and stock market crashes leading to recession are a few of the causes that cannot be accounted for beforehand. There are no techniques which can assist with helping to prevent these force majeure causes and as such these causes will be excluded from consideration.

Also, an SME becoming amalgamated into a larger firm due to the larger firm buying them out will not be considered a failure or a factor which determines success and such cases will be disregarded. If an SME is determined to have been sold to a larger firm in order to avoid failure and the reason for said failure is noted, it will be taken into consideration.

There are many measurements to determine whether a SUB was successful in its conclusion, such as breaking even, providing a unique service or customer satisfaction, these do not address the issue of a lack of mature SMEs in the South African economy. Exploration into the various measurements of success is beyond the scope of this study and success in the context of this paper is defined as survival of the business beyond the start-up phase.

1.10.4.3 Start-up Business and Project Environments

An exploration into the similarities, and differences, between the environments of SME start-ups and projects, is not only useful to reinforce that definite similarities exists between them, but also as a possible aid in the determination of which techniques might be beneficial toward increasing the success of SME SUBs. The differences between the environments of start-up SMEs and projects could also help determine the ways in which the techniques might have to be adapted in order to increase their effectiveness.

For this section of the study the scope will focus on difficulties experienced by entrepreneurs and project managers in their attempts to achieve successful businesses and projects respectively. Case studies and studies into the obstacles faced by each of these will be used to provide an image of the similarities and differences in their environments.

1.10.4.4 Project Management Techniques

Project management techniques have been developed in order to increase the rate of projects which are successfully completed (Meredith and Mantel, 2012). These techniques minimise the risk of failure of projects by either directly combating the causes of failure, or directing projects along a less risky path which avoids the failure causes (Meredith and Mantel, 2012). These techniques have been developed and refined through multiple “trial and error” cases, as each project could be seen as a test of the project management techniques used during its completion.

Techniques which have been proven to avoid or minimise specific causes of failure are of particular interest for this study, especially if those causes can be found to have a counterpart in the SUB environment. Techniques to help keep the project within the constraints of cost, time and scale are useful as well. As discussed briefly above, the constraints commonly occurring in projects are mirrored in SUBs.

1.11 Ethics

The research used to prepare the literature review for this study is available through academic sources or is publicly obtainable. Consideration was taken to ensure that the literature resources were used in a manner which upheld the ethics expressed by the Postgraduate School of Engineering Management at the University of Johannesburg. All work which is not the opinion or innovation of the researcher has been referenced and cited in an effort to remove any form of plagiarism from the study. The research data necessary was gathered in an ethical manner; the contact information was gathered from sources available to the public, the participants were made aware of the fact that the data would be used for research purposes, the participants were given the option of participating in the research, the context of the research was given to the participants and a definitive consent section was included in the questionnaire. The University of Johannesburg was also provided with a description of the method and purpose of the research and it was determined that the study was ethical.

1.12 Chapter Overview

Chapter 1 introduces the main topics of the paper as well as defines the objectives and research questions of the paper. The methodology used in researching the literature, choosing and proposing the adaptation of techniques is also discussed in Chapter 1, along with the scope of the investigation.

Chapter 2 provides literature reviews of the major background topics of exploring start-up business failure causes, project failure causes and the similarities between the environments surrounding start-up businesses and projects. As well as project management techniques which have been developed to combat the causes of failure.

Chapter 3 deals with the methodology used in the acquisition of the information of interest to this study in terms of the current level of project management techniques in use in start-up businesses in South Africa.

The findings of the research are explored in Chapter 4, along with the assumptions used in the research design phase and the statistics of the findings.

Chapter 5 provides concluding remarks as well as some recommendations into further study and development of a roadmap which could potentially benefit inexperienced start-up businesses.

1.13 Summary

Small and medium enterprises (SMEs) are vital to the global economy, being a driving force for economic growth (Muhammad, et al., 2010) and constituting 43.5% of all employment in the world (Aysan, et al., 2016). SME failure is pervasive in developed and developing countries.

South Africa has a large number of SMEs, with an estimated 90% of legal businesses being micro, small or medium in size (Smit and Watkins, 2012). The creation of jobs and the growth of the economy in developing countries depend on SMEs, however South Africa has one of the lowest rates of new businesses being started (Fatoki, 2014). Eighty percent of South African SMEs end in failure within two years and up to 90% of South African start-up businesses (SUBs) fail in 10 years (Van Scheers, 2011).

Projects are defined by the constraints they operate under, most commonly cost, time and scope (Meredith and Mantel, 2012). Project management was created for the express purpose of improving the rate of success for projects. Techniques have been developed by project managers to reduce the risk of project failure and assist in the successful completion of projects (Mir and Pinnington, 2014).

An analogy can be drawn between projects and start-up businesses through the comparison of the common constraints, objectives and the environments of each. Successful techniques that have been developed for project success can then be adapted to improve start-up business survival.

The research design for this study involves three key steps; collection, analysis and arrangement. These steps should ensure that the presented information reinforces the underlying argument and addresses the research questions. As a literature study, the method being used is the collection and analysis of published research.

Due to the high amount of literature on project failures (Lehtinen, et al., 2014) the scope of this study with regards to the causes of project failure was limited to recent publications; from the past five years. The literature used was also focussed into

papers which considered multiple projects, rather than specific case studies in order to obtain a more generalised perception of the most common causes of failure.

The scope of the start-up business failure research was focussed on studies that examined businesses which failed within the first four years, as this is a crucial point for South African businesses, with up to 90% failing within this period (Lussier and Halabi, 2010; Garwe and Fatoki, 2012). Of interest are specifically failures which were not related to external factors, such as violent conflict or natural disasters, for which there were possible actions which could have prevented the failure.

A comparison of the environments of start-up SMEs and projects not only shows a link but also helps in choosing and refining techniques which could benefit SUBs. The obstacles faced by entrepreneurs and project managers will be related through case studies and research on the obstacles faced by each.

Project management techniques have been developed and refined to overcome the causes of failure in projects, if these causes also occur in start-up businesses, the techniques are of interest in this study. Techniques which are used to ensure that projects are completed within their constraints are useful for this study as well.

The research for the literature was conducted within the bounds of the ethics of the Postgraduate School of Engineering Management and all unoriginal material was referenced and cited to the source from which it was obtained. The data used in the research was gathered ethically.

2 Literature Review

2.1 Project Failure

2.1.1 Introduction

Projects are being constantly undertaken by small and large organisations as well as individuals. The size, in terms of value or cost, and complexity of the projects can vary widely (ul Musawir, Serra, Zwikael and Ali, 2017), not just with the size of the organisation, but also with the ambitions of the controlling body. Not all projects are successful, some types of projects reporting success rates of only 23% (Langveldt, Bloch and Sivertsen, 2015). There are many causes for the failure of these projects (ul Musawir, et al., 2017), some dependant on the type of project or environment, but most could be the downfall of any project. One method of categorising failures, developed by Lehtinen, et al. (2014) could be to separate the failure causes into People, Methods, Tasks and Environment (2014). Another possible category that could be included to encompass most of the failure causes, if not all, are unavoidable causes outside of the control of a company or any possible prediction, such natural disasters or sudden wars (Batool and Abbas, 2017).

Project failure, being so prevalent, should be a major concern, and an area for definitive and active intervention, for any entity looking to undertake a project (Anthopoulos, et al., 2015). A project failure can result in many negative effects for a company. Partial or total loss of resources and time, which if these affect other areas of the entity possibly result in lost production, clients or complete failure of the business (Chen , 2015). Many methods to prevent failures have great advantages aside from only ensuring the success of the project, including making improvements to the project easier to accomplish, a reduction of costs by eliminating unnecessary losses, lowering development time, and increasing the overall quality of the completed project (Lehtinen, et al., 2014).

It is therefore understandable that there is a large volume of studies which have investigated the causes of project failure, perhaps in an attempt to proverbially help others avoid similar failures (Lehtinen, et al., 2014). The sharing of this knowledge has led to many advancements in the area of project management, and rapid paradigm shifts as competing corporations push to increase positive effects and reduce failures. One such development has been the realisation that the classic criteria of cost, time and scope/quality have been shown to be inadequate when determining whether a project will fail or not (ul Musawir, et al., 2017), and that new criteria have to be considered when determining heuristics for project failure.

2.1.2 Project Failure Definition

The definition of project failure is not as simple as it may seem. A project usually has multiple stakeholders, goals, limitations, benefits and costs. A project could meet the goals of one stakeholder but not another, or output certain benefits but not all. Such a project could be considered a success and failure in equal measure if each of the aspects of the project are considered or if the project is evaluated from the standpoints of the different stakeholders. Overrunning in costs or overstepping limitations could deem the project a failure, or shift the cost/benefit ratio into an undesirable area. Project failure cannot be considered a black and white factor (Montequin, Cousillas, Alvarez and Villanueva, 2016; Lundmark, 2017), but rather is relative to the business environment, effectiveness of investment as well as technological changes during or brought about through the project (ul Musawir, et al., 2017).

Failure can also be defined in a multitude of ways; if a project is not started due to changing environment or financial situations or many other reasons, excessively delayed, abandoned before completion, wasn't able to fully satisfy the specifications or didn't bring a return on investment (García-Quevedo, et al., 2014; Anthopoulos, et al., 2015). The view-point of the concerned party also affects the perceived success or failure of a project (Lehtinen, et al., 2014). While a stakeholder in the development organisation might be completely content with the results of a project, as it allowed for

growth within the company, the final client could determine the project a failure as it did not meet every single specification completely, or even if one vital specification was not exactly as desired.

It must also be considered that failure is not necessarily a negative outcome or undesirable (García-Quevedo, et al., 2014). Replacing an outdated, struggling or underperforming project for a similar, more profitable project is usually the right decision, cutting certain high cost, high risk or lower outcome projects while under financial strain could allow a company to focus on more efficient projects which in turn could help the parent organisation to survive (García-Quevedo, et al., 2014). The complete failure or abandonment of a project is what is usually defined as project failure (Lehtinen, et al., 2014).

2.1.3 Causes of Project Failure

There are many different reasons for project failure, this is due to projects, on average, being complex and having multiple critical factors determining their success or failure (Meredith and Mantel, 2012). Each of these causes could have varying levels of impact on a specific project, ranging from no impact to slight delays to complete failure and inability to continue the project (ul Musawir, et al., 2017; Batool and Abbas, 2017; Lehtinen, et al., 2014). Most of these causes have been found to be common among all projects, regardless of the type of project or the environment in which the project is undertaken. There are striking similarities between the causes of project failure documented in literature, from software projects to construction projects and even governmental and non-profit projects (Lehtinen, et al., 2014; Anthopoulos, et al., 2015; Batool and Abbas, 2017).

While most of the causes are common, regardless of the environment in which they are undertaken, the specific environment in which the project is being undertaken plays a large role in which causes have larger impacts on the project's success or failure (Lehtinen, et al., 2014; Montequin, et al., 2016). The environment referred to in this case is not only the type of business or entity controlling the project, but also the

nature of the limitations and goals of the project and the physical location of the project. The definition of an environment means that the environment of the project can be influenced by the controlling entity, the culture of the organisation or country (Jørgensen, 2014), the market in which the project resides and even the perceptions of the stakeholders (Jørgensen, 2014). Which means that each project will be unique and should be analysed for potential failure causes on a case-by-case basis (Lehtinen, et al., 2014). However, this does not mean that study of project failure root causes is useless, far from it, it merely means that the impact of potential failure causes should be investigated for each project.

The different causes of project failure are varied and usually only one major cause has been referenced as to the cause of failure for a project. There have been many attempts to categorise and determine common factors between projects which have been unsuccessful. One such attempt is shown in Table 1; Lehtinen *et al.* (2014) developed this table after analysis of various other studies into project failure of software projects and summarizing the influencing factors in a grouped table.

Table 1: Common causes of project failure categorised into 4 main groups (Lehtinen, et al., 2014, p. 624)

People	**Methods**	**Tasks**	**Environment**
Social interaction	Development work	Sales	Project complexity
Skills	Users	Customers	Available assets
Motivation	Top management	Requirements	Policies
	External agents	Contracting	Business domain
	Project team	Project management	Organisational structures
	Cooperation	Quality control	Technology
		Development work	
		Software testing	

As can be seen in Table 1, the factors could apply to almost any project, aside from software testing, which could be substituted with quality control, product testing or alignment with stakeholders' specifications. There are many different causes for projects to fail and the reasons could be case specific or related to the type of project;

innovation projects are prone to failures due to high levels of uncertainty and asymmetrical information (García-Quevedo, et al., 2014). Due to this, not every cause of project failure can be given a detailed and thorough accounting in this study. The most common causes from literature are amalgamated and presented below.

2.1.3.1 Resources

The lack of any required resources can be a major contributing factor to making a project unsuccessful (Lehtinen, et al., 2014). Even if the resources are not completely available due to delays or currently being occupied by another project, this setback could have a large impact on the viability of the project as a whole. The vital resources are not necessarily financial, lack of resources in terms of scale - the size and priority of the project among all the current projects, or information – information on changing markets, clients altering their requirements or new products and technologies becoming available (ul Musawir, et al., 2017; Lehtinen, et al., 2014; Batool and Abbas, 2017; Anthopoulos, et al., 2015; García-Quevedo, et al., 2014).

Lack of financial resources are mentioned extensively as strong reasons for failure, often cited as the main or only reason that a project had failed (Lehtinen, et al., 2014). Financial resources could be obtained internally from the controlling entity or from external investors, each of the sources having its own limitations and benefits. An interesting pattern which was pointed out in literature was that internal financial constraints only affected the projects potential for failure in the early conceptual stages, while pressure from external investors could lead to project failure throughout the project's life-cycle, from conception to completion (García-Quevedo, et al., 2014).

Lack of information, obtaining information irrelevant to the project's environment or using incorrect information is also a large factor in the failure of a project (ul Musawir, et al., 2017). Without information relevant to the project environment and the stakeholders of the project, design-reality gaps are common; making decisions based on perceived markets or specifications leads to project outcomes that are not aligned with reality (Anthopoulos, et al., 2015). A lack of crucial skills also becomes a prevalent

issue (Lehtinen, et al., 2014; Anthopoulos, et al., 2015); without knowledge pertaining to which skills will be required to complete the project or ensure correct project outcomes, the use of inexperienced workers or a lack of skilled specialists to perform difficult tasks results in incomplete or failed projects.

It is also evident that bad work practices are a factor, from lack of experience or knowledge of better practices or incorrect information on the project team itself (Lehtinen, et al., 2014). These bad work practices can often result in poor management of the project at any stage and not knowing the correct manner to handle the project team (Burke, 2014). The mismanagement quickly becomes evident and corrodes the motivation of the stakeholders, project team and upper management (Lehtinen, et al., 2014; Anthopoulos, et al., 2015). Mishandling of the project team can also lead to a lack of interproject cooperation (Lehtinen, et al., 2014; Batool and Abbas, 2017). Any of these failings, leading back from a lack of information on how to motivate the right people for the project team, could potentially precede a project's failure.

2.1.3.2 Management

Bad governance of a project or the organisation as a whole was also found to be a common determinant in project failure (Lehtinen, et al., 2014). The bad management was further compounded by a vague chain of accountability and responsibility, in some cases it was found that were projects that had failed without a clearly defined project leader or manager (Lehtinen, et al., 2014; Batool and Abbas, 2017). The lack of clear roles in the project was most commonly seen when the governing entity had a lack of confidence in the project from the start, resulting in little to no consideration as to the composition of the project team, setting up a management structure for the project or defining project team roles (García-Quevedo, et al., 2014; Anthopoulos, et al., 2015; ul Musawir, et al., 2017).

Regardless as to the presence of a clear or experienced project manager, the project could easily fail if no goals and objectives were established early in the project's conceptualisation (Anthopoulos, et al., 2015). It was also found that the stakeholders

had to be involved in the determination of these goals (Lehtinen, et al., 2014; Batool and Abbas, 2017; ul Musawir, et al., 2017) as without their commitment conflict ensued and this lead to a communication breakdown (García-Quevedo, et al., 2014; Anthopoulos, et al., 2015). The lack of clear objectives also resulted in goals and objectives that were misaligned or completely different to the expected outcomes of the stakeholders, which increased the likelihood of a project being abandoned before completion (García-Quevedo, et al., 2014).

When goals and objectives were being reconsidered and developed throughout the development cycles of the schedule, budget and project plan, this action led to an increased chance for the project to succeed (Jørgensen, 2014; Lehtinen, et al., 2014; Batool and Abbas, 2017). Delivering frequent reports to involved stakeholders and upper management also helped to instil confidence from those involved, allowed for better priority of the project and faster recognition of potential problem areas which needed to be addressed, this had a definite increase in the success of a project (Jørgensen, 2014).

2.1.3.3 Business Environment

The environment in which the project is undertaken can also present potential causes of failure. Changes in the market, potential competitors, new technologies and legislature can have a definite effect on whether a project succeeds or fails (Jørgensen, 2014). Market changes and failures, and shifts in the external business environment were found to be large portion of the reason for project failure (García-Quevedo, et al., 2014). In some cases, this was compounded when stakeholder exclusion resulted in project managers not realising that the shift in an indirect market changed the client's requirements for the project (Lehtinen, et al., 2014). Market determination and potential client studies not being performed caused many projects to fail because of low sales and customers (Batool and Abbas, 2017). External factors from competitors not being analysed also caused failure in some innovation projects when they entered the market as expected quality and features had increased since

the inception of the product (Jørgensen, 2014; Lehtinen, et al., 2014). The lack of current features and requirements drastically affected the entity's ability to compete with competitors and appeal to clients, even after the necessary changes were included in future iterations (Montequin, et al., 2016).

Causes related to the external, non-business environment also need to be considered. These can include war, social paradigm shifts, natural disasters, changes in legislature and changes in the economics of the resident nation (Batool and Abbas, 2017). While some of these are unavoidable and unpredictable, politics and geographic locations should be studied prior to project inception, and the risks weighed, as certain areas are more prone to war, strikes, bad weather and natural disasters (Batool and Abbas, 2017).

2.1.4 Causal Links

In most cases there isn't a single cause which leads to project failure, but rather a multitude of failure causes and poorly managed project areas which are interlinked. These connected causes and areas of failure compound upon each other and result in project failure (Lehtinen, et al., 2014). For example, social failures can significantly affect technical areas of a project which could result in substandard project management, all of these could cascade and lead to project failures (Chen , 2015). A project is usually much more complex than it appears on the surface, with many variables being interlinked and dependant on each other (Hughes, Dwivedi, Rana and Simintiras, 2016). Failure in a single or multiples of these interlinked factors could very possibly result in failure of the dependant areas (Hughes, et al., 2016).

2.1.5 Summary

Although there usually is not a single cause for failure in projects, there is a single perceived cause for failure, which is then reported in literature (Hughes, et al., 2016).

These are usually the causes which had the largest impact on the success or failure of the project (Lehtinen, et al., 2014). Table 2 summarises the failure causes, found in literature, described above.

Table 2: Summary of the causes of failure for projects

General	Specific	Authors
Resources	Financial	(Lehtinen, et al., 2014)
	Information	(ul Musawir, et al., 2017)
	Experience and knowledge	(Meredith and Mantel, 2012)
Management	Structure	(Batool and Abbas, 2017)
	Goals and objectives	(Anthopoulos, et al., 2015)
	Involving stakeholders	(Jørgensen, 2014)
Environment	Market	(García-Quevedo, et al., 2014)
	Competitors	(Jørgensen, 2014)
	Non-business	(Batool and Abbas, 2017)

2.2 Start-Up Business Failure

2.2.1 Introduction

A start-up business is a business, still in the early stages of development, started by an entrepreneur, with the goal of fulfilling a market niche or need, usually with a novel and innovative product or service (My Accounting Course, 2019 A). Small and medium enterprises are fully-fledged companies, usually stemming from successful start-up businesses, they typically have smaller numbers of employees and a lower economic footprint individually (My Accounting Course, 2019 B). Start-up businesses (SUBs) and small and medium enterprises (SMEs) are extremely important to the economies of every country and the global economy as a whole, making up 43.5% of the global employment rate (Aysan, et al., 2016).

If a SUB is successful the usual outcome is a SME. The SME is formed is when the start-up business has stabilised and found a reliable market for the products, services or combination of both which were developed during the start-up phase. It can therefore be postulated that if the success rate for SUBs is increased, this would then increase the rate at which SMEs are developed. With SMEs being such large contributors to the economy and the employment rate, we could expect to see an increase in the economic growth and the employment rate of any areas which are able to increase the success rate of start-up businesses.

While a large number of start-up businesses are created annually, a very large percentage of those businesses fail to survive past the start-up phase, or longer than 4 years. In the United Kingdom, an estimated 381 000 business were started in 2018, while approximately 336 000 businesses closed down (Merchant Savvy, 2020). In the United states of America, less than 50% of small businesses survived for five years (Dautovic, 2019). According to Rhodes (2014) and Merchant Savvy (2020), many of the businesses in the United Kingdom that were started had as few as 10 employees. Using a minimum employee count of ten means that small to medium enterprise closures in 2018, for the United Kingdom alone, accounted for the loss of, at minimum, 2.8 million jobs.

There are many factors which contribute to the success of a start-up business. Including, but not limited to, the start-up business's marketing strategy, market penetration, whether there is a market for the product or service, the management of the business and the availability of financial support. Affecting the management of the business is potentially the easiest factor of success to influence; generally the management of the company is under the care of only one person, that person has a large influence over the entirety of the business and it isn't dependant on external factors like public perception, as is the case with improving the market for a product or service. Therefore, perhaps the simplest method for reducing the number of jobs lost due to small and medium enterprises closing down, and for effecting economic growth through these businesses is to, in some manner increase the effectiveness of the management of the small and medium enterprises, and to reduce the causes for failure that management has control over.

The causes of failure in SUBs and SMEs have been explored fairly thoroughly in research, throughout the years (Nemaenzhe, 2010). Start-up businesses failures seem to be pervasive throughout vastly different atmospheres, across different periods of time and in developed countries as well as developing countries. And although many factors, such as gender (Hazudin, Kader, Tarmuji, Ishak and Ali, 2015), could alter an entrepreneur's perception of the key issues which would determine the success of the business, there are causes which seem to be common and widespread regardless of the type of business or entrepreneur.

Nemaenzhe (2010) explored the causes of failure in South African small businesses and identified a number of key areas in which mismanagement or a lack of resources could lead to the failure of a start-up business. These key factors can change throughout the business lifecycle as the business growth and develops, as the obstacles and resources of the company change. The start-up period of the business, generally the first few years and when the business is most vulnerable to failure, is characterised by vital management needs in marketing, product demand, business experience and resources (Nemaenzhe, 2010)

The earlier years of a business, or the start-up phase, are when it is most vulnerable to mismanagement leading to failure (Hazudin, et al., 2015). The mismanagement is most often explained by the lack of crucial experience or guidance and this absence of expertise and guidance could lead to failing to perceive or react in a timely manner to potential obstacles which could cause the business to fail; in the financial sense these obstacles could be that financiers might be reluctant to support such ventures or in mismanagement of the financials by the controlling parties of the start-up business (Hazudin, et al., 2015).

A significant amount of the failures of start-up businesses could possibly be attributed to a lack of experience and knowledge on the part of the entrepreneur or owner (Nemaenzhe, 2010). A start-up business is usually created when an entrepreneur discovers a market niche for a specific product or service (My Accounting Course, 2019 A), if the entrepreneur is inexperienced or not knowledgeable in the required background or in business management itself, the business could easily fail. Some of

the other reported causes of failure might have also been avoided if the issue of this lack could have been addressed by a more experienced or knowledgeable controlling stakeholder. For example, financial issues are another widely reported source of failures (Nemaenzhe, 2010; Abor and Quartey, 2010; Anthopoulos, et al., 2015), but with proper experience or knowledge, better avenues of funding could potentially have been found or more accurate determinations of starting and running costs would have been applied in the business model, leading to a better understanding of the more sensitive financial areas of the business.

2.2.2 Start-up Business Failure Definition

Determination of failure in a start-up business or small to medium enterprise is an important, but relatively complicated matter. A SUB could be said to have failed for a number of reasons (Fatoki, 2014). But this usually results in the company declaring bankruptcy or selling off its assets or name to another company and generally ceasing to conduct any business. However, a company that is sold to a larger company is not necessarily a failure; the sale of a company could be considered a success for the entrepreneur, and some small companies are sold for incredible sums of money (Hawkey, 2017).

Due to the break point of four years identified by Lussier and Halabi (2010), this could be considered the point at which a start-up business has survived and can be said to have matured into a small to medium enterprise. Some start-up businesses can take less than four years to bypass the start-up phase and some companies can take longer than four years before they are considered stable and past the start-up stage of growth (Hawkey, 2017). While this four-year point may be relatively arbitrary, it is required for the purposes of this study.

Even a company which breaks even at the time of closure could be considered a success; if it allowed an entrepreneur to conduct enough business and earn a reasonable salary for a number of years, after returning the initial invested capital (Fatoki, 2014). If a business is unable to recuperate the capital input of the

entrepreneur or its investors, there has been a net loss in value and this cannot be considered a success (Fatoki, 2014). The goal of the entrepreneur should not just be to recuperate the capital outlay though, a return on the investment is commonly expected, this is achieved through a profit after the initial capital has been recovered through business transactions (Hawkey, 2017). The inverse of this is also possible however, and a business that survives past the four-year point through amassing large amounts of debt is probably on the path to failure and therefore cannot be considered a success.

SUB and SME failure is even more prevalent in South Africa than other developing countries (Garwe and Fatoki, 2012). Garwe and Fatoki (2012) report that approximately 80% of South African SMEs fail within the first two years. The high rate of failure of South African SUBs shows a definite need for development of strategies targeted at the start-up phase of these businesses. The percentage of South African SMEs that fail in the four-year period increases to 90%, well above the global average (Garwe and Fatoki, 2012).

While the many ways in which a business can fail are important in the next section of this study, it is important to note what the definition of success in this context requires. For the purposes of this paper, a business can be said to have successfully survived the start-up phase when it has passed 4 years of age and has generated profit above the starting capital. Failure therefore, in this context is the inverse of this situation, either the business has failed within the 4-year period or there have been no profits, sometimes even increasing debt, after the 4-year period.

2.2.3 Causes of Start-up Business Failure

There are a multitude of reported causes for the failure of SMEs and the SUBs from which they originate (Nemaenzhe, 2010; Crush, et al., 2015). A possible reason for this wide coverage is that the failure of these SUBs and SMEs is so pervasive and abundant (Cant and Wiid, 2013) that it has attracted the attention of many researchers, who are concerned with discovering the reason that SUBs and SMEs are so prone to

failure. The impact of SMEs and SUBs on the economy and job creation is also known, and this is a possible reason for the large amount of research in this area (Abor and Quartey, 2010; Rhodes, 2014; Aysan, et al., 2016).

There seems to be almost no correlation between the industrial climate; developing and developed countries, and the risk of failure being faced by the start-up businesses and the established small and medium enterprises in those countries (Hazudin, et al., 2015). The lack of correlation is also true for the type of business which is being created by the entrepreneur; all start-up businesses have a moderately high chance to fail (Aysan, et al., 2016). While the industrial climate does not appear to have an effect on the chance for a company to fail, it can have an influence on the type of business which is being created; if a developing country has no electricity, there is little value in developing an IT company. However, the type of business and the industrial environment in which it is being created can have an effect on which causes have a larger effect on the success or failure of a business (Fatoki, 2014).

In developed countries certain particulars of the environment can be a hindrance to the success of the SME and SUB. Laws and bureaucracy in developed countries can stifle the ability of these companies to be flexible, which if there is a sudden shift in the market could lead to business failure (Lampadarious, 2016). In developed countries, competition can also be more abundant as many companies could already exist which could, with small changes, produce the same product or service with lower initial costs (Lampadarious, 2016). It was also found that the other critical challenges faced by SMEs and SUBs in the UK, which affected the chances for success, were the acquisition and management of capital and resources (Lampadarious, 2016).

The environment of developing countries has characteristics which influence SMEs and SUBs (Fatoki, 2014); lacking infrastructure, social challenges and unavailability of newer technologies could either drive innovation or be an obstacle for business success (Fatoki, 2014). Some SMEs have adapted to the challenges posed by the environment; developing business practices that bypass them, while other SMEs have become successful by providing alternatives to the lacking technologies and infrastructure (Nemaenzhe, 2010; Fatoki, 2014). There are many factors affecting the

viability of SUBs in developing countries (Chittithaworn, Islam, Keawchana and Yusuf, 2010), including business or product type, knowledge and style of management, resources and finance, and the external environment (Chittithaworn, et al., 2010).

As can be seen above, the challenges or obstacles facing SMEs and SUBs in developed and developing countries can be vastly different. Despite this, the factors which are critical for their success were found to be the same despite the different business and governmental environments (Nemaenzhe, 2010; Lampadarious, 2016). These factors could be grouped into Resources, Management and Environment.

2.2.3.1 Resources

Start-up businesses require a number of resources in order to function and produce products and services effectively (Fatoki, 2014). Many sources have reported a lack of resources as a major contributing factor to the success or failure of a SUB or SME (Muhammad, et al., 2010; Nemaenzhe, 2010; Fatoki, 2014; Rhodes, 2014). These resources can vary in type and importance to each company, dependant on the type of business or the environment; skilled and unskilled labour, required materials, finances or information (Fatoki, 2014). While a lack in any of these resources is detrimental to the growth and survival of a SUB, possibly the most visible and therefore most cited critical resources are financial resources.

Finances are widely reported as being an extremely critical resource in determining whether a business will succeed (Chittithaworn, et al., 2010). A lack of financial resources is often quoted as the major reason that a SUB failed (Garwe and Fatoki, 2012). Financial resources can take many forms, start-up capital, investments, loans and income. Start-up capital is the amount of funds that the entrepreneur has available to start the business before any product or service has been delivered to its customers (Derera, Chitakunye and O'Neill, 2014). If the start-up capital is insufficient for the business to accomplish its goals, investors are usually sought, told about the company and persuaded to invest in the company for some form of increased return or shares of the business (Nanda and Rhodes-Kropf, 2013). Loans are sums of money usually

acquired from a financial institution, which must be paid back with interest over a fixed time period (Berger and Black, 2011). Income is money that is earned through profits, over the costs, of the product or service supplied by the company. If all of these sources of income are exhausted or unavailable the SUB will be unable to conduct its business and is extremely likely to fail, as it will be unable to acquire the materials required to continue providing products and services.

A lack of the materials required for the output of the company's products and services is also a cause for the SUB to fail (Nemaenzhe, 2010). Even a delay in the delivery of these supplies could cascade into a backlog of work, customer dissatisfaction and even potentially cancelled orders. Without the resources to continue supplying products and services, the revenue stream could dry up, leaving the company in a negative financial situation without the financial resources to continue functioning or employing the necessary labour force (Chittithaworn, et al., 2010).

The labour force of the SUB is made up of the required human resources in order to produce the desired output of the company. It usually consists of skilled and unskilled workers. Skilled workers performing specialised tasks which require training and unskilled workers performing more mundane tasks which require little to no specialised training (Vivarelli, 2013). Both skilled and unskilled labour are needed in most companies in various amounts, a lack in either can be detrimental to the SUB. Without the necessary skilled employees, the technical aspects of the product or service will be unfulfilled; without the unskilled employees, delays can form and employee dissatisfaction can occur if skilled workers are required to perform the mundane tasks outside of their job description (Vivarelli, 2013).

Pertinent information is also a valuable resource to a SUB, as it allows for the determination of pivotal business decisions and is extremely valuable in allowing a SUB to remain flexible in order to survive in a shifting economic market (Cassar, Ittner and Cavalluzzo, 2015). Information as a resource allows managers and entrepreneurs to make the most beneficial decisions for the company, allow them to alter or tailor the supplied product or service to better suit the market niche and in negative situations

allow for a gentler business exit without the accrual of excess debt (Allen, Gloor, Colladon, Woerner and Raz, 2016).

2.2.3.2 Management

The management of a SUB or SME is an extremely vital factor of success or failure for the company; a good manager could allow the company to survive in a shifting market, while a bad manager could make decisions that cause the business to fail even in relatively stable environments. The management of a SUB is concerned with the decisions which could affect the output, focus of the labour and other resources of the company. Bad management of the company or even bad management of the suppliers to that company were found to be critical factors for the survival of SUBs (Chittithaworn, et al., 2010).

Clear business plans incorporated by the management of the SUB were found to have a positive effect on the success of the start-up business (Chwolka and Raith, 2012). These plans are most beneficial if the planning process is started before the business is started, as it allows the management structure of the company to make pertinent decisions on the direction of the company from the beginning (Chwolka and Raith, 2012). Planning early in the start-up phase also allows for the development and improvement of strategies for marketing and choice of which ideas to pursue and which to terminate (Chwolka and Raith, 2012). Inclusion of the other stakeholders, such as the investors, in the planning phase could also be valuable, as this allows for more realistic expectations and can result in strategies which have been examined from multiple angles.

Including other shareholders in the planning stage could also possibly help in avoiding oversights in the design of the business plan with regards to the financial and governmental environment. It is vital that the management of a SUB be aware of the environment in which the SUB with be created and attempt to do business (Salamzadeh and Kesim, 2015). For success to be a more likely outcome the

management of the SUB should examine the corporate and financial atmosphere, but also allow for changes in the environment (Salamzadeh and Kesim, 2015).

2.2.3.3 Environment

The environment in which the SUB or SME is created and conducts its business affects the factors which will determine the success or failure of the SUB or SME (Salamzadeh and Kesim, 2015). The environment includes, but extends beyond, the existing trends in the market, limitations of the market, legal issues and the availability of the required infrastructure and technology (Salamzadeh and Kesim, 2015). Environmental changes and effects were also reported as more heavily affecting SMEs and SUBs than established firms, in both developing and developed countries (Chittithaworn, et al., 2010; Rhodes, 2014; Salamzadeh and Kesim, 2015).

The trends of the environment include changing technologies, some companies under development were unable to succeed because the technology they had based their initial idea on had become obsolete before their development stage had concluded (Nemaenzhe, 2010). A SUB could also fail due to the limitations of the market that it is competing in, if it is a very niche market, the client base might be unable to support the need for a whole company dedicated to that specific product or service. Legal issues might also require the SUB to develop specific standards of production, if these are not planned for or known, the product or service might have to be drastically altered at an increased expense that might make it impractical to the targeted consumer (Fatoki, 2014). As discussed earlier, a SUB will also be unable to be successful if the required infrastructure or technology is unavailable and the company is unable to adapt to its lack or develop an alternative means of fulfilling that requirement (Nemaenzhe, 2010; Fatoki, 2014).

External, non-business environmental shifts can also have drastic effects on a SUB (Salamzadeh and Kesim, 2015). A civil war taking place in the area where the SUB is situated or a market crash due to changing governmental policies can easily cause the failure of a SUB or even a well-established SME. These effects cannot be planned

for however and the contribution to the statistical failure rate of SMEs and SUBs is comparatively minor (Nemaenzhe, 2010; Salamzadeh and Kesim, 2015).

2.2.4 Summary

An entrepreneur's impression of the key causes leading to the success or failure of a business is often affected by a variety of factors, such as the gender of the entrepreneur, the country in which the business is being started or the type of company being started (Hazudin, et al., 2015). The reported causes of failure from literature show that start-up businesses fail due to causes that are apparent regardless of these factors (Anthopoulos, et al., 2015; Nemaenzhe, 2010). Table 3 summarises these causes within the general areas that they occur.

Table 3: Summary of the causes of failure for start-up businesses

General	Specific	Authors
Resources	Financial	(Garwe and Fatoki, 2012)
	Materials	(Chittithaworn, et al., 2010)
	Labour	(Vivarelli, 2013)
	Information	(Cassar, et al., 2015)
Management	Structure	(Batool and Abbas, 2017)
	Business plan	(Chwolka and Raith, 2012)
	Involving stakeholders	(Salamzadeh and Kesim, 2015)
Environment	Market	(Fatoki, 2014)
	Technology or infrastructure	(Nemaenzhe, 2010)
	Non-business	(Salamzadeh and Kesim, 2015)

2.3 Project and Start-up Business Characteristics

2.3.1 Introduction

In examining the causes for failure between projects and SUBs, it is possible to see several commonalities between the critical success factors of the two. Both are affected similarly by a lack of resources; financial, labour and information, both are negatively impacted by poor management and both can be harmed or helped by their environments; within the companies and without. A further examination of the characteristics of projects and SUBs could reveal further similarities between the two and this would provide further evidence for the possibility that the techniques developed to increase the success of projects could be adapted for use within SUBs in order to increase the success rate of those SUBs. The specific characteristics that will be examined pertain to the major areas in which failure causes have been reported; resources, management and environment.

The resource characteristics of projects and SUBs which will be explored are the financial resources, human resources, material resources and information resources. In terms of finance the characteristics of specific interest are the source of the finances, the expected return on the initial finances and potential for failure from financial pressures. For human resources the areas to be researched include the availability of labour; skilled and unskilled, and the effects of labour shortages. Material resources are briefly discussed in terms of delays and information resources in terms of the source of information available.

Management in projects and SUBs must be examined in terms of the “chain-of-command”; who the controlling entities of each section are and who they report to, and the planning phase of the project or SUB. The environment in which the project or SUB is being undertaken is also of relevance and the potential effects to each from the external and internal environments are discussed.

A discussion on the comparison of the characteristics is provided in the last subsection as well as a summarised table. The comparison is important when considering the following section on Project Management techniques as these techniques were developed within the project environment in order to increase the success rate of projects, and similar characteristics would point to evidence that similar techniques might be used in SUBs.

2.3.2 Project Characteristics

Projects have definite characteristics, as is evidenced in their definition; an endeavour, with a limited timeframe and budget which results in a singular goal, product or service (Meredith and Mantel, 2012). While some special and highly specific projects slip outside of this definition in one or more ways; by having no limit in budget or timeframe for example, this definition is suited for the majority of projects being undertaken (Meredith and Mantel, 2012). Projects are undertaken by an entity; a company, individual or organisation, and each entity has a specific atmosphere in which the project must be completed. The atmosphere determines the nature of the project, its goal and the resources available to the team responsible for the project (Meredith and Mantel, 2012).

Possibly the most visible resources available to each project are the financial resources; the acceptance of the project is usually based on the required financial resources and the return on these resources (Burke, 2014). The entity through which the project is accepted is the most likely source for the investment of funding for the project, however, funding is occasionally acquired from external investors (García-Quevedo, et al., 2014). Financial pressures from the internal sources have been found to have an effect on the failure of a project during the inception phase, while external investor pressures have been reported to affect failure throughout the entire life-cycle of the project (García-Quevedo, et al., 2014). The condition for the acceptance of a project, by either the internal or external sources, is usually a return on the investment, a benefit surpassing the value of a metric determined by the sources, usually based

on standard investment rates (Meredith and Mantel, 2012). A reduction in this return or an increase in the required financial resources after the initialisation of the project could lead the project to be abandoned by the controlling entity or the external investors (Chen , 2015).

Another key characteristic of a project is the project team; the group of individuals responsible for ensuring that the project is completed within the limitations of time and budget (Meredith and Mantel, 2012; Burke, 2014). The project team is accountable for the determination of the other resource requirements of the project, such as materials and labour, and the potential use of financial resources to acquire them. The individuals chosen for the project team might not be experts in the required technical fields for the project and, if poorly planned, the budget for the project might not allow for the extra costs of hiring or consulting with required experts (Alias, et al., 2014). Labour and expertise might be found within the controlling entity, but it might not be available within the timeframe of the project, which could lead to delays (Meredith and Mantel, 2012).

In some projects, material components are required for their completion; in the construction of the completed goal or its constituents (Batool and Abbas, 2017). These materials impact the completion and cost of the project in a few ways; in the determination of the initial budget, if the required materials are delayed and if the materials are of an unacceptable quality for the requirements of the project (Batool and Abbas, 2017). The lack of required materials could render a project infeasible due to extra costs or delay the completion of the project past an important deadline (Alias, et al., 2014).

Information is also an important resource for projects. If there is a lack of information about the technical difficulty of a specific project, the budget or project team might not include the required expertise for the completion of the project (Anthopoulos, et al., 2015). A lack of information can also lead to misconceptions as to the availability of required resources, technology or infrastructure (Alias, et al., 2014). Information sources for projects include the project team's knowledge, the information contained

within the controlling entity as well as external sources; this might be limited by the level of innovation employed in the project (García-Quevedo, et al., 2014).

The management of a project is performed through the project team, which usually has a project manager to report to, who usually has some form of management structure in the controlling entity which oversees the project. The chain of command is usually dependant on the structure of the controlling entity or the goals of the project (Meredith and Mantel, 2012). The project team manages the day-to-day progress of the components of the project in order to ensure successful completion (Rauniar and Rawski, 2012). One of the most important, initial duties of the management structure of the project is the planning phase of the project, with specific attention to the budget, return on investment and the required materials and expertise (Papke-Shields, Beise and Quan, 2010).

It is also important to remember that the project is being undertaken within a specific environment, an environment determined by the structure and philosophies of the controlling entity (Burke, 2014). The project could be cancelled for reasons specific to the corporation or individual through which the project is running, due to changes within the controlling body (Bodiako, Ponomareva, Rogulenko, Karp, Kirova, Gorlov, and Burdina, 2016). The external environment could also have large effects on a project; new technologies, legal actions or societal shifts could render a project infeasible or obsolete (Batool and Abbas, 2017).

2.3.3 Start-up Business Characteristics

The characteristics of each SUB are dependent on a large number of individual effects such as the characteristics of the entrepreneur, the type of business being started, the product or service being developed, the environment of the market and the external environment that the SUB is being created in (Kang and Ha, 2012). Despite the multitude of differences between SUBs, there are common characteristics that can be found between them as there are common causes for failure (Abor and Quartey, 2010; Chittithaworn, et al., 2010; Nemaenzhe, 2010). As shown in preceding sections many

of the causes for failure in SUBs can be grouped and generalised; a lack of resources (financial, labour, material and information), mismanagement and effects of the environment. These groups can then be used to explore the common characteristics of SUBs.

One of the most reported causes for failure in SUBs is a lack of financial resources (Nemaenzhe, 2010; Garwe and Fatoki, 2012; Fatoki, 2014). The lack of financial resources can lead to the conclusion that a characteristic of SUBs is a limited access to financial resources. The sources that are available to SUBs are the starting capital of the entrepreneur, possible external investors, loans from financial institutions and the sales of products, the latter has no bearing on the very early stages of the SUB life-cycle as there are no sales until a product or service is developed (Derera, et al., 2014). These financial sources are usually dependant on a profitable and reliable return on the initial investment; investors might expect increased monetary returns or shares in the business, financial institutions expect the loans to be returned with interest and the entrepreneur is expecting to reap the profits of the SUB (Nanda and Rhodes-Kropf, 2013). If these returns are not forthcoming, the support of the financial investors could be withdrawn and the business or its assets might be sold to recuperate the majority of the losses (Hawkey, 2017).

The human resources available to SUBs are limited, the entrepreneur must hire labour for the effort that they are unable or unwilling to perform themselves (Debrulle, Maes and Sels, 2013). If special tasks are required for the SUB, freelancers and other external temporary labour could be acquired, however these come with additional risks that the entrepreneur should be prepared for (Burke and Cowling, 2015). Shortages in the necessary human resources can have large negative effects on some SUBs (Abor and Quartey, 2010). Delays are a common experience when the required labour is unavailable, however, if the requirement is time-sensitive due to market competition or the nature of the SUB's product or service, the lack of this resource can be catastrophic and lead to SUB failure (Nemaenzhe, 2010). In some highly innovative SUBs, the required experience or knowledge might be completely unavailable or might be unaffordable to the entrepreneur, this leads to a high level of uncertainty and can

affect the willingness of external sources to invest in the business (Nanda and Rhodes-Kropf, 2013).

Depending on the product or service being developed by the SUB specific materials or information might be required in order to properly develop the output of the company (Paschen, 2017). For example, in order to produce stock for the sale of a new product that product, as well as any prototypes, must first be made, or, relevant information must be acquired in order to develop a service which will satisfy the potential customers. Material delays could negatively impact the business as running costs are not dependant on the arrival of these resources, and it may allow for competing SUBs to enter the market at an advantage (Nemaenzhe, 2010). Information is available from a number of sources, each with varying degrees of reliability, experts are usually reliable but have a cost, surveying potential customers is time consuming and sometimes unreliable and market analysis depends on the skill used by the analyser (Kassim, 2017). Incorrect or obsolete information can also be detrimental to a SUB in that the entrepreneur will be unable to produce relevant products or services or might make incorrect business decisions based on uncertain markets that could lead to the failure of the SUB (Kang and Ha, 2012; Fatoki, 2014).

The management of a SUB is usually in the hands of the entrepreneur, as the owner and originator they need to decide the initial business direction and the planned goals and output of the company (Chwolka and Raith, 2012). As the workforce of the company grows, additional managers might be added to oversee specific parts of the company, such as a site manager to ensure that necessary construction is accomplished (Debrulle, et al., 2013). One of the most important initial duties of the entrepreneur is to develop a business plan. The plan is crucial to attract investors and has shown that with a clear business plan the chances for success are increased (Chwolka and Raith, 2012).

The environmental effects faced by SUBs include the existing trends in the market, limitations of the market, legal issues and the availability of the required infrastructure and technology (Salamzadeh and Kesim, 2015). External, non-business

environmental shifts can also have drastic effects on a SUB (Salamzadeh and Kesim, 2015).

2.3.4 Comparison

The comparison of the characteristics of projects and start-up businesses from the above section shows that there are a number of similarities that can be drawn between the two. However, there are definite differences which have been explored above. While similar characteristics have been observed in the financial issues, limited human resources, requirement of materials, the need for relevant and accurate information and the effects of the external environment, there are definite differences between the management structure of projects and SUBs, as well as the internal environment in which they operate. The management structure of a SUB is usually almost entirely dependent on the entrepreneur or owning shareholders, while the final project decisions are controlled by the controlling entity. The environment in which the SUB operates is determined more by the market in which the entrepreneur wants to enter and the limitations of the area in which the company is started. In projects these same environmental determinants exist, but are mediated and in some cases buffered by the parent company. Table 4 summarises the similarities and differences between projects and SUBs.

Table 4: Comparison of project and start-up business characteristics

Characteristic	Project	Start-up business
Finances	Limited by internal budget or external investors (Meredith and Mantel, 2012)	Limited by capital or external financial sources (Fatoki, 2014)
Human resources	Limited to team or available skilled workers (Meredith and Mantel, 2012)	Limited by entrepreneur's skill set, availability of labour or funds (Debrulle, et al., 2013)

Table 4 cont.: Comparison of project and start-up business characteristics

Materials	Certain materials may be needed or delays might ensue (Batool and Abbas, 2017)	Certain materials may be needed or delays might ensue (Paschen, 2017)
Information	No budget for experts or limited information within company (Alias, et al., 2014)	Limited budget for hiring experts, sources might be unreliable or unavailable (Kassim, 2017)
Management	Controlled by project team, manager and parent company (Rauniar and Rawski, 2012)	Controlled by the entrepreneur with additional managers added as needed (Chwolka and Raith, 2012)
Environment	Internal environment effects from parent company as well as external environment effects (Meredith and Mantel, 2012)	Market, technological, legal and infrastructure effects as well as external environmental effects (Salamzadeh and Kesim, 2015)

2.4 Project Management Techniques

Project management techniques (PMTs) have been developed, tested and refined over many years and the effects on the success of projects has been well documented and reported (Burke, 2014). The tools and techniques for managing projects also include methods for handling and organising large quantities of data which could help with the organisation of the complex systems interconnected within a project (Burke, 2014). The techniques that have been developed which may be most useful to entrepreneurs are those centred around improving the areas where failure causes have been reported; resources, management and environment. Some of the techniques which will be examined are project planning techniques, processes of project management and the organisational structure of projects. Various methodologies and tools, such as Agile or Lean, are also being developed by project managers constantly to minimise the failure rates found in projects (Meredith and

Mantel, 2012; Burke, 2014), which as discussed are similar to those of start-up businesses.

The tools and techniques being used by project managers are constantly being tested through their application in projects, this means that the techniques which have been used for any length of time are not just theoretical, they have been proven to improve on one or more aspects of project management (Burke, 2014). Some of the PMTs are used throughout the life-cycle of the project, from inception to closing, while others are only used for specific phases of the project, in order to accomplish a certain task or goal (Patanakul, Iewwongcharoen and Milosevic, 2010). While some project managers use techniques throughout almost the entire project, Patanakul, et. al (2010) reported that most techniques would be more effective when only applied to certain phases of the project, sometimes applying a certain technique in other phases of the project could even be detrimental to project success. The use of these techniques is by no means a unified theory (Garel, 2013), rather their use is often dictated by the project's controlling entity (Patanakul, et al., 2010) and each controlling entity uses its own methodology and combination of techniques (Garel, 2013).

Due to the multitude of factors with which the success of a project could be measured (Anthopoulos, et al., 2015), it is extremely difficult to determine whether a project management technique has affected the success rate of a project, even more so the extent to which it has influenced the project (Patanakul, et al., 2010). The difficulty has led to the fact that there are relatively few papers studying the statistical effects of how PMTs affect overall project success (Patanakul, et al., 2010). Project managers were also found to be using techniques without understanding the effect that the techniques were having on the success or failure of the projects they were managing (Patanakul, et al., 2010). The lack of understanding could be the cause of the increased popularity in the use of project management methodologies (Serrador and Pinto, 2015).

A project management methodology is a collection of PMTs and a guideline on when and where to use them (Serrador and Pinto, 2015). Certain project management methodologies have gained widespread use in a variety of projects, one of these methodologies is Agile (Serrador and Pinto, 2015). Agile focusses on allowing a

project to be developed with integral flexibility, focussing less on the planning phase of a project, and allowing the project to evolve as required throughout its life-cycle (Serrador and Pinto, 2015). Serrador and Pinto (2015) reported that through multiple statistical analyses the Agile methodology was found to have a positive influence on the success of a project. The PMTs used in each project management methodology are developed to help project managers overcome specific parts of project management which are difficult and can affect the success of the project (Burke, 2014).

PMTs were developed to combat failures caused by lacking resources involve techniques which improve the planning process and allow it to be constantly updated throughout the development stage of the project (Meredith and Mantel, 2012). Involving multiple shareholders in the planning process and allowing the project plans to have integral flexibility, from the conception phase to the termination phase, means that the project is more resilient to early changes and there is less chance for oversight of crucial factors (Meredith and Mantel, 2012). Some of the tools for achieving this are the Gantt chart, the resource histogram and activity crashing plans (Burke, 2014).

Associated with the planning techniques, risk analysis and management are recommended to be conducted regularly in order to minimise the chances of unforeseen risks having negative effects on the project (Meredith and Mantel, 2012). Burke (2014) also recommends a risk management plan and disaster recovery plan to be implemented throughout the project. Risk management is already being applied throughout large businesses and could be beneficial to start-up businesses to reduce the risk from the market environment as well as the external environment (Dionne, 2013).

Risk management in a project context is a process aimed at reducing risks or the impact of unavoidable or unpreventable risks on a project (Burke, 2014). The risk management is performed through a series of steps; discovering potential areas of risk, determining the likelihood of the risks, analysing the effects that these risks would have on the project if they occurred, categorising the severity of the effects and developing plans to minimise the risk and its effects (Meredith and Mantel, 2012; Burke

and Cowling, 2015). A disaster recovery plan is a plan which is developed, in the case of catastrophic failure of risks that were unplanned for, unseen or from external uncontrollable sources, in order to allow for the project to still be successful or at least recover as much as possible of the investment into the project (Burke, 2014).

The techniques developed for project management which improve the project manager's ability to control the project, have effective organisational structure and the management processes of projects could be of interest in helping reduce the causes of failure in start-up businesses to do with management. Control techniques used in project management include methods for managing time, scope, cost, quality and resources (Burke, 2014). The use of matrix organisational structures and temporary management structures in order to accomplish specific tasks in project management allows the controlling entity to flexibly realise more projects and complete them with a higher success rate (Burke, 2014). The management processes developed for project management were developed with methods for the management of procurement, human resources, stakeholders and communication. These techniques were designed in a way that provides linear steps or interrelated actions in order to accomplish a goal (Burke, 2014).

Patanakul et al. (2010) investigated the impact of the use of PMTs in specific phases of a project. It was found that the use of certain PMTs had an impact on the success of a project, if they were used at a specific phase of the project life-cycle (Patanakul, et al., 2010). The phases used by Patanakul et al. (2010), in the chronological order of the project life-cycle, were the conceptual, planning, execution and termination phases. Not all the effects were positive, some had a detrimental effect on project success, and none were found to have an impact throughout the entire project lifecycle (Patanakul, et al., 2010). Table 5 provides a summary of the impacts of PMTs when they are applied in specific phases of the project life-cycle, PMTs which had no effect on the success of the project were omitted (Patanakul, et al., 2010).

Table 5: Impact of PMTs in specific phases of a project (Patanakul, et al., 2010, p. 56)

Project management technique	Impact on project success	
	Phase used in	Impact
Analogous estimate	Conceptual Planning	Increased market competitiveness
Checklist	Execution	Increased use of product by intended client
	Conceptual	Decreased overall success
Communication plan	Conceptual Execution	Increased overall success Increased inclusion of required specifications Increased customer satisfaction
Contingency plan	Planning Execution	Increased overall success Increased time management Increased conformity to budget
Cost baseline	Planning Execution Termination	Increased conformity to budget
Critical path method	Planning	Increased time management Increased conformity to budget Increased inclusion of required specifications

Table 5 cont.: Impact of PMTs in specific phases of a project ***(Patanakul, et al., 2010, p. 56)***

Hierarchical schedule	Planning Execution	Increased use of product by intended client Increased customer satisfaction Increased overall success
Lessons learned	Termination	Increased financial benefits
Milestone analysis	Execution Termination	Increased time management Increased overall success
Work breakdown structure	Termination	Increased inclusion of required specifications

An analogous estimate is the estimation of characteristics of a project such as the budget, timeframe and labour hours, from the characteristics of another, similar project (Burke and Cowling, 2015). In the early phases of the project, the exact details of the processes and goals required to complete the project are unknown. An analogous estimate would be appropriate in these earlier phases, to allow for quick estimations (Patanakul, et al., 2010).

The purpose of a checklist is to list the steps or goals of the phase of the project in order to ensure that they are all completed before moving on to the next phase. In the early stages of project development, the scope and requirements of the project are not fully available or understood, a checklist therefore would be counter-productive as its rigidity could prevent the project from evolving to its fully realised plan (Patanakul, et al., 2010). The checklist is still a useful technique when used in the later stages of the project life-cycle (Patanakul, et al., 2010).

A communication plan allows for quick and effective channels of communication to be developed, by determining the method and timeframe of communication and the

stakeholder responsible for any required communication (Meredith and Mantel, 2012). The communication plan reduces unnecessary waiting times for communication from stakeholders who are uninvolved with the specific area of the project and encourages open and effective flow of information (Patanakul, et al., 2010).

A contingency plan is a plan of action to be enacted if or when an established risk occurs (Burke and Cowling, 2015). It is usually an ancillary plan which takes over in the case that the original plan for the project is unable to be realised (Burke, 2014). The contingency plan should be developed in the planning phase and constantly be updated as resources are required and goals are met, this allows the project manager to always have an up-to-date backup plan throughout the project (Patanakul, et al., 2010).

The cost baseline of a project is a plan for the amount of money needed by a project and when that cost will occur during the project life-cycle (Meredith and Mantel, 2012). Although this technique might be costly or time-consuming to the parent company, the use of a cost baseline can help to ensure that a project remains within its budget (Patanakul, et al., 2010).

The critical path method is a technique of time management planning, which determines the path, along which the required steps of the project which follow each other, where the critical path has the longest time through the schedule (Burke, 2014). The critical path method determines the shortest possible duration of the project; any delays in the critical path will delay the entire project (Burke and Cowling, 2015). The techniques gives focus to the project managers on which activities will have the largest impact on the overall schedule of the project, and where delays could be the most costly (Patanakul, et al., 2010).

A hierarchical schedule, is a schedule, tailored for each hierarchy of the organisational structure, with different levels of detail for each level of the hierarchy, for example the project team will have a more detailed schedule than the client (Patanakul, et al., 2010). The tailored schedule allows relevant stakeholders to receive information which

affects them, without having to interpret irrelevant information, this could also reduce unnecessary communication (Patanakul, et al., 2010).

A lessons learned document details the interesting and relevant occurrences and developments during the project lifecycle, including potential improvements and unforeseen risks (Patanakul, et al., 2010). The document allows these lessons to be carried forward into future projects, regardless of the project team or manager, which could increase the financial benefit of those future projects, which could avoid similar mistakes and risks (Patanakul, et al., 2010).

The milestone analysis method is a method of comparing planned costs and schedules with the actual costs and schedules as a means of determining project performance at specific point during the project's life-cycle (Burke, 2014). The milestone analysis technique allows for projects to be completed closer to the planned schedule and budget, and allows for project evaluation after the project has been completed (Patanakul, et al., 2010).

A work breakdown structure (WBS) is a plan encompassing the entire project with levels, each descending level describing in higher and higher detail the steps and goals required to accomplish the steps in the higher levels (Meredith and Mantel, 2012). The schedule allows the relatively complex project to be broken down into manageable pieces of work, allowing for a clearer schedule to be developed. In the termination phase of the project, the WBS can act as a sort of check to ensure that all the work has been completed (Patanakul, et al., 2010). These techniques, which have been found to have an impact on project success (Patanakul, et al., 2010), will form the basis of the research conducted in the following chapters.

2.5 Conclusion

In conclusion, the above sections have shown that failures in start-up businesses are similar to those of projects in that the areas in which the failures occur; resources, management and environment, are not just similar in terms of general description but

have some almost identical causes. Financial issues, mismanagement of human and physical resources, information discrepancies, mismanagement of the project or company and the negative effects of the environment in which the project of start-up business are being conducted are causes of failure in both projects and start-up businesses.

The characteristics of projects and start-up businesses are also extremely similar, with minor differences occurring in the management structures and the direct effects of the market, legal and infrastructure environment. Techniques developed for project management, in order to combat the causes of failure in projects, were discussed. The ability to adapt these techniques for use in start-up businesses is a direct interest of this study. In the following chapter the use of project management techniques in start-up businesses in South Africa is explored.

2.6 Summary

2.6.1 Project Failure

Projects are being undertaken constantly by a variety of entities. While the resources and skills required to complete these projects can differ greatly, and the availability of these differs among entities, project failure is a major concern for all undertaking or planning to undertake a project. Project failure is a complex and diverse area, with many different definitions for failure, complicating factors in determining failure or even positive decisions in choosing to intentionally abandon a project or put it on hold. While the definition of project failure can be a complicated process, project failure is usually accepted as complete abandonment or inability to produce expected outcomes within the limitations or costs.

Although there are many reasons for project failure that are shared across a variety of circumstances, the exact nature of the environment in which the project is undertaken has large implications in which causes will have a larger effect on the project's success or failure (Lehtinen, et al., 2014; Montequin, et al., 2016). The studied literature found three major failure causes which could be considered universal to projects of any scope.

The first of the three major causes, lack of resources, can have a large impact on whether the project will be successful or not (Lehtinen, et al., 2014). A lack of financial resources, scale, skills or information could all be defined within the cause of lack of resources (ul Musawir, et al., 2017; Lehtinen, et al., 2014; Batool and Abbas, 2017; Anthopoulos, et al., 2015; García-Quevedo, et al., 2014). A lack in financial resources appears to be the most commonly cited cause from this group (ul Musawir, et al., 2017), however, lacking in information can lead the project team down an incorrect or disastrous path from the onset (Batool and Abbas, 2017).

Another group of causes stem from the bad governance of a project or the organisation as a whole. Including a lack in clearly defined accountability and responsibility, having no clear project lead, manager or hierarchy (Lehtinen, et al., 2014; Batool and Abbas, 2017). The bad governance most often results in missed deadlines and poor quality-

control for the project and in the worst of cases complete breakdown of project team structure and project goals (Batool and Abbas, 2017).

External causes due to the business, social and governmental environment can also have a very large impact on the viability of a project (ul Musawir, et al., 2017). In many cases these causes are impossible to be prepared for as there was no history or warning of them, however, the political and geographical environments should be observed and considered; war, strikes, bad weather and natural disasters are more commonplace in some areas than others (Batool and Abbas, 2017).

There is usually more than one cause of failure which leads to the failure of a project. The group of causes and mismanaged project areas have been found to be, in most cases, interlinked. The connected causes can cascade down and compound upon each other, such that, while one of them may have not causes project failure, this effect resulted in complete project failure (Lehtinen, et al., 2014).

2.6.2 Start-up Business Failure

A start-up business (SUB) is a business in its early stages of growth and development, when an entrepreneur has identified a market niche and developed a suitable product or service which applies to that niche (My Accounting Course, 2019 A). The usual goal for a SUB is for it to become a small to medium enterprises (SME). SMEs are vital to the growth of any economy, especially in developing countries, making up approximately 43% of global employment rates (Aysan, et al., 2016).

While a large number of start-up businesses are created each year (Rhodes, 2014), a very large proportion of them are unsuccessful and fail within 4 years (Lussier and Halabi, 2010). In the start-up phase of business growth, the business is its most vulnerable (Hazudin, et al., 2015), with key areas of vulnerability in marketing, product demand, business experience and resources (Nemaenzhe, 2010).

A lot of these early business failures could be attributed to a lack of experience and knowledge on the part of the controlling stakeholders in the start-up business. Many of the early obstacles faced by the fledgling businesses could possibly be navigated successfully by experienced or well-informed business management. Management of the business is also possibly the simplest area to affect improvement on the success rate of the start-up business, as there are fewer external variables and, usually only a few management positions in a small to medium enterprise.

For the purpose of this study the definition of start-up business failure is the inverse of the definition of start-up business success. In this paper, a start-up is considered successful, once it has successfully transitioned out of the start-up phase by surviving as a business for a minimum of 4 years and is producing a steady profit above the starting capital.

There are many different reported causes for failure within SUBs and SMEs (Nemaenzhe, 2010; Crush, et al., 2015). SUBs and SMEs have a high failure rate regardless of whether they are being created and operated in a developed or developing country (Fatoki, 2014; Rhodes, 2014). The industrial climate; developed or developing, does influence which factors could have a larger effect on the success of a SUB, as well as affect the type of SUB which could prove to be more successful (Chittithaworn, et al., 2010; Lampadarious, 2016). The causes of failure for SUBs could be grouped into resources, management and environmental.

Resource failures involve the lack and mismanagement of finances, labour, materials and information. Finances could be obtained in a multitude of ways, each having its own negatives, however these finances are a crucial requirement for the operation of the SUB (Garwe and Fatoki, 2012). Labour resources are the access and management of skilled and unskilled workers, both of which are usually needed in varying amounts dependant on the type of business, and a lack in either could lead to delays or unsatisfactory output for the company which could result in failure (Vivarelli, 2013). Information is a valuable resource for entrepreneurs, allowing them to create more flexible and successful SUBs as well as making more informed decisions with regard to the direction of the company and its outputs (Allen, et al., 2016).

The primary concerns of SUB management are the decisions which affect the output, focus of the labour and other resources of the company, management failures are related to bad decision making with regard to these areas (Chittithaworn, et al., 2010). The presence of a clear business plan before the start-up of the company was found to have a positive effect on the success of the start-up business (Chwolka and Raith, 2012). It was also found to beneficial to include other shareholders, such as potential investors, in the planning stage of the inception of the start-up business (Fernández-Guerrero, Revuelto-Taboada and Simón-Moya, 2012).

The business environment around a SUB includes, but extends beyond, the existing trends in the market, limitations of the market, legalities and the availability of the required infrastructure and technology (Salamzadeh and Kesim, 2015). The challenges faced in the environment include changing technologies, limitations of the market that the SUB is competing in, legal obstacles as well as available and changing infrastructure and technology. Non-business environmental shifts can also have drastic effects on a SUB's chances for survival and success.

2.6.3 Project and Start-up Business Characteristics

Project characteristics, are described through the definition of a project; an endeavour, with a limited timeframe and budget which results in a singular goal, product or service (Meredith and Mantel, 2012). The acceptance of the project is usually based on the financial resources needed for completion and benefit gained, by the source, from the investment of these resources (Meredith and Mantel, 2012; Burke, 2014). The main workforce of a project is the project team; the group of individuals responsible for ensuring that the project is completed within the limitations of the project (Burke, 2014). Material components are required in certain projects and delays and increased costs could have detrimental effects on the success of the project (Batool and Abbas, 2017). Information is also an important resource for projects, sources of information for projects include the project team's knowledge, the information contained within the controlling entity as well as external sources (Batool and Abbas, 2017). Day-to-day

management of a project is performed through the project team, who are managed by the project manager, who is usually managed by a structure dependant on the structure of the controlling entity (Meredith and Mantel, 2012). One of the main initial duties of the management structure of the project is the planning phase. Projects could be cancelled for reasons specific to the controlling entity, as well as the external environment (Batool and Abbas, 2017).

While there are many differences between SUBs, the common characteristics are evident from the common causes for failure (Abor and Quartey, 2010; Chittithaworn, et al., 2010; Nemaenzhe, 2010). Some characteristics of SUBs are: limited access to financial resources, any effort not being performed by the entrepreneur must be hired (Debrulle, et al., 2013), specific materials or information might be required, the entrepreneur is usually the sole management structure. The effects of the environment are defined by trends in the market, limitations of the market, legal issues and the availability of the required infrastructure and technology (Salamzadeh and Kesim, 2015). External, non-business environmental shifts can also have drastic effects on a SUB (Salamzadeh and Kesim, 2015).

Although the majority of characteristics are shared between projects and start-up businesses there are differences, these are observed in the management structure and internal environment of projects and start-up businesses.

2.6.4 Project Management Techniques

Project management techniques (PMTs) have been developed, tested and refined over many years (Burke, 2014), these include methods for handling and organising large quantities of data. The most useful to entrepreneurs are those for improving the areas where failure causes have been reported; resources, management and environment. Failure causes in resources are linked to shortages, project management techniques which improve the planning process could be applied to improve this (Meredith and Mantel, 2012). Risk analysis and management techniques could reduce the risk from the market environment as well as the external environment

(Dionne, 2013). The techniques for control, organisational structure and management process can help with reducing the management causes of failure.

Not all PMTs have an impact on project success, and, some even have negative impacts when used in the incorrect phases of the project life-cycle (Patanakul, et al., 2010). The PMTs that were found to have an impact on project success were the use of analogous estimates, checklists, communication plans, contingency plans, cost baselines, critical path method, hierarchical schedules, lessons learned, milestone analysis and a work breakdown structure (Patanakul, et al., 2010). Checklists were the only technique found to have a definitively negative impact on project success when used in the conceptualisation phase (Patanakul, et al., 2010).

Failures in start-up businesses are similar to those of projects, especially in terms of resources, management and environmental effects. The characteristics of projects and start-up businesses are also similar. Techniques developed for project management might be useful in combating failure in start-up businesses.

3 Research Methodology

3.1 Introduction

Many inexperienced researchers are tempted to consider the process of researching as a simple, linear operation; answer a particular question using a particular method (Saunders, Lewis and Thornhill, 2016). Saunders, et al. (2016) however, suggests that a more detailed approach is required for adequate coverage of the research questions; a multi-layered 'onion' approach, starting outward and moving inwards from research philosophy to theory development, methodology, strategy, time horizon and finally culminating in the determination of the techniques and procedures to be used. Figure 4 is the visualisation of the 'onion' approach to research methodology, which will be used extensively in the construction of this chapter (Saunders, et al., 2016).

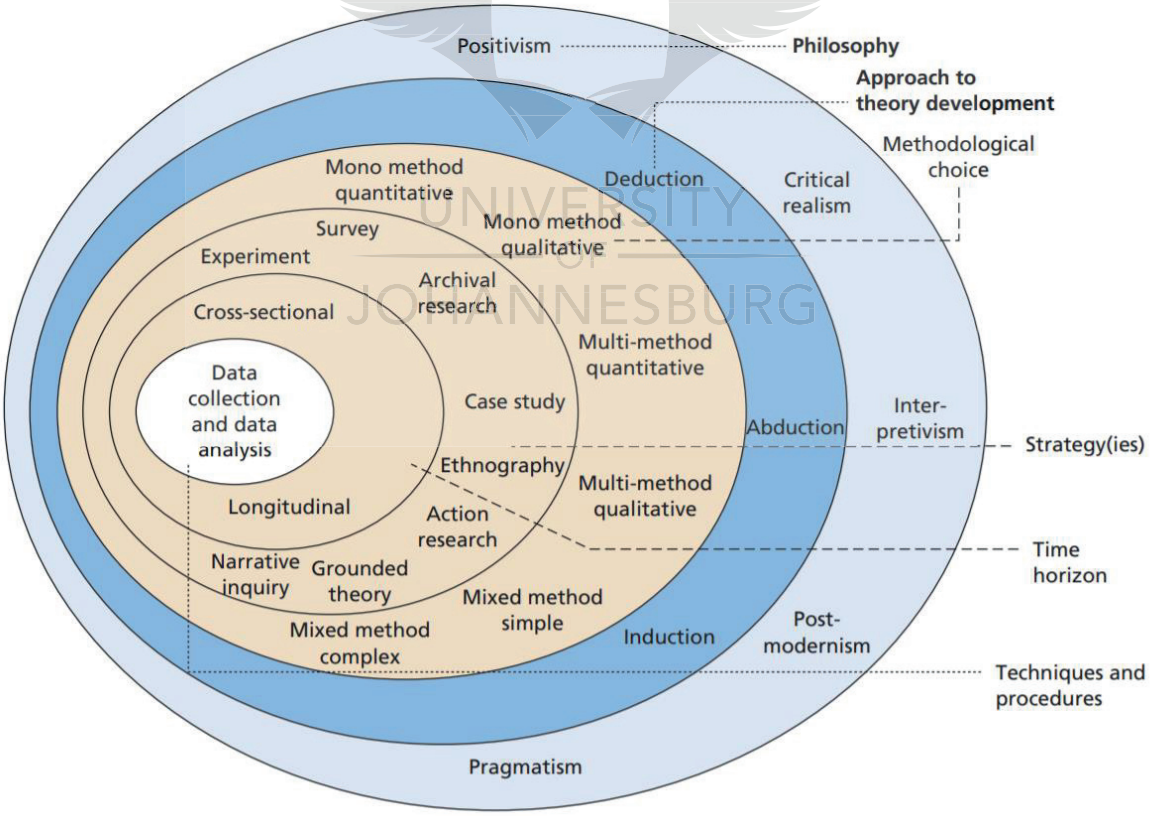

Figure 4: The research 'onion' (Saunders, et al., 2016, p. 124)

Research philosophy is an arrangement of ideas and ideals concerning the growth of a body of knowledge through research and the assumptions which would be made throughout the research (Saunders, et al., 2016). A consistent and well-considered philosophy allows for the determination of appropriate choices in methodology, strategy, data collection and analysis methods (Saunders, et al., 2016). Research philosophies are differentiated through the assumptions they make, the objective or subjective extremes, and the paradigms of regulation or radical change which are incorporated by these philosophies (Saunders, et al., 2016). The assumptions, paradigms and extremes of each philosophy are in a state of change depending on the social and business environment, with definitions changing as time passes (Mkansi and Acheampong, 2012; Onwuegbuzie and Frels, 2013). Saunders, et al. (2016) describes 5 major research philosophies; positivism, critical realism, interpretivism, postmodernism and pragmatism.

Theoretical approaches are used in research methodology as a means to determine the method in which the data collected will be used to draw or test conclusions (Saunders, et al., 2016). There are three main approaches to theory development apparent in literature; deduction, induction and abduction (Minnameier, 2010). Deductive reasoning is the most commonly used in scientific research methodology, with non-deductive approaches traditionally being viewed with criticism. Recently however, induction and abduction have become more understood, with specific criteria developed and studied (Minnameier, 2010). Inductive approaches have been found to be more useful in determining intangible or abstract conclusions (Saunders, et al., 2016). Abduction involves the combination of methods; in deduction a theory is tested through the data, in induction data is used to determine a theory, abduction involves going back and forth between theory and data (Saunders, et al., 2016).

The methodology of research is the first step in developing a research design, it is the choice between qualitative, quantitative or mixed methods designs, as well as whether a single method will be sufficient or, in the case of mixed method designs, the level of complexity needed (Saunders, et al., 2016). The main differences in qualitative and quantitative designs are the goals; quantitative designs are aimed at determining numerical or statistical conclusions, while qualitative are more concerned with social

aspects and philosophical conclusions (McCusker and Gunaydin, 2014). If either of these designs is incorporated into a single method of data collection it is termed 'mono method', if more than one data collection technique is used, from either qualitative or quantitative (not a mix of both), it is a 'multi-method' approach; a mixed methods approach utilises both qualitative and quantitative designs (Saunders, et al., 2016). The research design is also dependant on the type of study to be conducted; descriptive, evaluative, explanatory or exploratory (Saunders, et al., 2016).

The research strategy is the plan or method by which the research questions will be answered in a coherent and succinct manner, and should be suitable to the research questions being investigated (Saunders, et al., 2016). The strategy employed should also take into consideration the available time-frame of the research as well as the potential available data and its sources (Saunders, et al., 2016). Saunders, et al. (2016) discusses several strategies; experiment, survey, archival and documentary research, case study, ethnography, action research, grounded theory and narrative inquiry. These strategies can be used in conjunction with each other or as part of one another (Saunders, et al., 2016). The time horizon of research is a determination of the range, in time, for which the research will be conducted; if the research would be applied to a single time span it is cross-sectional, if it spans over a length of time, usually to determine the incremental changes in a topic, it is longitudinal (Saunders, et al., 2016).

Arguably one of the first considerations when deciding on appropriate techniques for data sampling is the sample size and population characteristics (Saunders, et al., 2016; Suri, 2011). The sample must be large enough so that any analysis, such as statistics, would be meaningful, and must have the characteristics which would correspond to the target sample; the population that would contain the required data (Suri, 2011). The principle techniques used for data collection are collecting from secondary data, observation, interviews and questionnaires (Saunders, et al., 2016). The technique used corresponds to the type of data required and the availability of the data through each technique (Saunders, et al., 2016).

3.2 Philosophy and Theory

There are three assumptions regarding research methodologies; ontological, epistemological and axiological (Saunders, et al., 2016). The ontological assumptions in this research are that an underlying cause for start-up business (SUB) failure is that entrepreneurs who lack experience make mistakes which lead to business failure, and that a SUB could be analogised to a special type of project. The epistemological assumption is that access and use of a body of methods, which have been shown to be effective in project management, would help to bridge the lack of experience. The axiological assumption is that this body of knowledge will increase the success rate of SUBs, leading to an increased employment rate and economic growth. These assumptions are all leaning towards objectivism, however, the philosophy of the research is not extreme objectivism, as it is believed that there is no universal correct method for SUBs to succeed and the objective is only to increase the success rate, by lessening some of the avoidable failure causes. The paradigm in which the research will be focussed is more regulatory, within the functionalist paradigm. Although the social biases of obtaining data from a single country, South Africa, are recognised, as in critical realism, and that a positivist philosophy is useful for remaining aloof from the research, a pragmatic philosophy will be assumed for this research; the ultimate goal is to positively influence organisational procedure (Saunders, et al., 2016).

A deductive approach will be taken during the data collection and results phase of the research presented in this paper, however, an abductive, long term abductive study may be advocated as a follow up to this research as a study of the effects, if any, of following the recommendations made. The overall theory that is adopted in this study is that the use of project management techniques (PMTs) in the start-up phase of a South African business will help to increase the chance of success for that business, or inversely, PMTs are not being used in the start-up phase of South African businesses, which contributes to the high failure rate of SUBs. For the scope of the research in this study, it will be studied whether South African SUBs are utilising the PMTs which Patanakul, et al. (2010) reported as having a positive influence on project success. As was shown in the preceding chapter, the causes of failure and the

environments of projects and SUBs are remarkably similar, this could lead to the belief that a SUB could be considered a special type of project. Even the definition of a project could suit a SUB; it is an endeavour, with a limited time frame (until the business is mature), a limited budget (determined by the available start-up capital and investors), with a specific goal (to create a successful and stable business) (Burke, 2014). Therefore, it is required to collect data on whether or not South African SUBs are using PMTs, and if there is a correlation between the use of PMTs, if any SUBs are utilising them, and SUB success.

3.3 Methodology

A quantitative design was decided on, as the required outcome of the study is definitively numerical and statistical in nature; the rate of PMT use in South African SUBs and if there is any statistical correlation to be found between the use of PMTs and SUB success. The quantitative design also suits the deductive approach described in the above section. A mono-method research design is appropriate for the nature of the data which is of interest for this study. The research design will be a combined exploratory and evaluative study; are PMTs being used by South African SUBs? And, if they are, how effective are the techniques at improving the chances for success of the SUB?

3.4 Strategy and Time Horizon

There are several strategies for data collection; experiment, survey, archival and documentary research, case study, ethnography, action research, grounded theory and narrative inquiry (Saunders, et al., 2016). The required data is not suitable for many of these strategies; an experiment requires precisely altering one variable and studying the effect on a second variable, the required data is not typically documented for archival and documentary research, a case study would not be sufficient for the required statistical analysis, an ethnography is a study of the culture of a specific

group, action research would be more suited to the recommended follow up research, grounded theory is for inductive approaches and a narrative inquiry is a personal account of events (Saunders, et al., 2016). Therefore, the best suited strategy for the collection of the required data is the survey strategy. The survey strategy is appropriate for the deductive approach to be used in the study, it is commonly used for exploratory and quantitative research and allows the collection of data from large groups, which can be used for statistical analysis (Saunders, et al., 2016).

The focus of this study is the use of PMTs in South Africa at the time of this study. A longitudinal time horizon is not useful in this case, it is used to study the change and development across a period of time (Saunders, et al., 2016). A cross-sectional time horizon will be used as it gives insight into the current situation, which is the focus of the study; the techniques and procedures used for the collection of data will reflect this.

3.5 Technique and Procedures

3.5.1 Quantitative Design

A survey strategy can be completed through the use of certain techniques; questionnaires, structured interviews and structured observations (Saunders, et al., 2016). A questionnaire is the preferred method for this study as it allows for large amounts of data to be collected from a wide range of participants, without the need for a personal connection and can be completed in the shortest amount of time. The participants for this study, its unit of measurement, are owners of a small to medium enterprise (SME) in South Africa. The choice of SME owners as the unit of measurement is because most SMEs are the result of a start-up business, and the owners are the most likely candidates for being the entrepreneur, and therefore would have knowledge of the processes used to start-up the business. The questionnaire designed, and presented in Appendix A, is centred around the 10 PMTs, shown in Table 5 and discussed in Chapter 2, reported by Patanakul, et al. (2010) to have an impact on project management success. The choice of these techniques was done to

have a literary background for the possibility of the PMTs to have an effect on the success of SUBs, as well as to minimise the number of questions in the questionnaire, as shorter questionnaires were seen to have a positive impact on the response rate (Rolstad, Adler, and Rydén, 2011).

The purpose of the questionnaire will be to gather data which might be useful in answering the second research question; which project management techniques could help improve start-up business success? In order to accomplish this, first, it must be determined if project management techniques are being used by entrepreneurs during the start-up phase. In order to limit the scope and focus on techniques which have been shown to have an effect on project success, only the techniques discussed in Chapter 2, present in Table 5, will be studied. Any apparent effects of the use of the techniques on the success of a SUB is to be studied as well.

The questions will firstly provide insight into the level of experience of successful and failed businesses of South African entrepreneurs. Then the questionnaire will be used to discover the use of the discussed project management techniques in failed and successful businesses. Questions concerning the opinion of the participant on the usefulness of each techniques will also be used to gain an awareness of the perceived usefulness of each technique.

3.5.2 Population and Sample

For relevant statistical analysis to be performed a suitable sample size should be used. As an initial exploratory study, a small scope is acceptable in order to determine any potential for trends, as such a sample size of 100 participants was arbitrarily chosen. The easiest and most cost-effective method of distributing the questionnaire was electronically, specifically, a mail-merged email list with a short description and a hyperlink to the electronic questionnaire. The correct application of the techniques as well as the standards of practice applied are beyond the scope of this study. The email list was generated through the use of a custom search engine, created through Google Custom Search Engines (Google, 2019), to find the email addresses of small business

owners in South Africa available through LinkedIn (LinkedIn, 2019). Additionally, this allows the sample to be randomly selected as there was no selection process. The mail-merged email description also included a plea to forward the link to other small business owners, in order to 'snowball' the sample, increasing it gradually as more potential respondents were contacted. The response rate for emailed questionnaires reported in literature varies wildly, with some values as low as 20%, and others as high as 84% (Rolstad, et al., 2011; Suri, 2011). A 35% response rate was estimated, due to the potential growth of the 'snowball' effect and to ensure a statistically relevant sample size. Therefore, the population size of the email list was set at 350 participants.

3.5.3 Analysis

The data being gathered would not be useful in itself, the interpretation of the data is needed in order to become useful. In order for interpretation of the data to be possible, statistical analysis, charts and graphs will be used. The statistical analysis depends on the data collection method, the type of data gathered and the amount of data which is gathered (Saunders, et al., 2016). The charts and graphs allow for visual comparison of the data. The statistical analysis and visual comparisons of the data will allow for meaningful, accurate and valid results to be discussed. These results are only meaningful if the data collected is reliable and valid.

3.5.4 Validity and Reliability

The reliability of data is the accuracy to which it describes the actual happenings or understanding of the studied material (Saunders, et al., 2016). The validity of the data refers to the usefulness of the collected data to the pertinent research questions under consideration (Saunders, et al., 2016). Data can only be reliable and valid if the data collection method results in data which is consistently understood by the participants. In order to ensure a consistent understanding from the source of the data, the SME owners, care must be taken to express the questions clearly (Saunders, et al., 2016).

In order to ensure the data collected resolves into valid results the questions also need to be designed in such a way that the measurements match the research questions.

As discussed, the research being conducted is an early exploration into any potential trends between the use of PMTs and SUB success. It is therefore not essential to validate whether the sample matches the entire population or that the results would be reliably reproduced in future studies. In order to minimise any biases which may affect the validity of the study, the potential participants were chosen randomly, from a targeted search of entrepreneurs and small business owners.

3.5.5 Ethics

Finally, the research must be conducted in an ethical manner. Ensuring the good ethics of the questionnaire is accomplished through designing the process in such a way that it conforms to four principles; autonomy, beneficence, non-maleficence and justice. Autonomy refers to allowing the participants to have informed consent in deciding whether or not to participate in the research (Saunders, et al., 2016). Beneficence is not vital to ethical procedure, it is the implication that the research will have a positive effect on the field, rather than a neutral effect (Saunders, et al., 2016). A non-maleficent research design is one in which no harm comes to the participants of the study through the gathering of the data or the effects of publishing the data (Saunders, et al., 2016). Justice is the principle that states that the benefit to the population from which the sample is taken will be greater than the risks undertaken by that population (Saunders, et al., 2016).

3.6 Summary

A thorough and comprehensive approach was adopted to ensure that the research adequately covered the research questions. Starting with research philosophy; a set of assumptions and paradigms which guide the choices of research methodology. Theoretical approaches are then used to determine the method to draw or test conclusions. The approach leads to a methodology choice between qualitative, quantitative or mixed methods designs and whether a single method is sufficient. The research strategy is then decided, it is the plan or method by which the research questions will be answered. The time horizon is the time span of interest to the study. The sample size and population characteristics are then considered. And finally, the specific techniques to be used for data collection are chosen.

For this study a pragmatic philosophy will be assumed as the goal is to positively influence the procedure of business start-up. A deductive approach was decided for the data collection. A quantitative research design will be used, to provide statistical and numerical results. The best suited strategy for the philosophy, approach and design was determined to be the survey strategy. A cross-sectional time horizon will be used as the current time-frame is of interest to the study. A questionnaire was decided on as the method for data collection, with the unit of measurement being owners of a small to medium enterprise (SME). The questions will be centred around the 10 project management techniques (PMTs) discussed by Patanakul, et al. (2010). A sample of 100 participants was deemed acceptable for statistical analysis. The ultimate design is a mail-merged email questionnaire with an estimated 35% response rate. The results will be presented with statistical analysis, charts and graphs. To promote validity the measurements of the questionnaire must match the research questions. The research must also be conducted in an ethical manner.

4 Findings

4.1 Introduction

As discussed in the previous chapter, in an attempt to achieve 100 participants, 350 online questionnaires were distributed electronically to emails collected through a custom search engine targeted at entrepreneurs and small business owners. The questionnaire was designed as a quantitative analysis with the goal of answering the research questions developed earlier in the paper. The questionnaire was opened for responses for 1 month, from the 1st of November to the 1st of December, 2019.

The completed surveys were then collected and combined in order to analyse the effectiveness of the assumptions used and the statistical results of the questionnaires. The results were sent to UJ Statkon, the department of the University of Johannesburg for the ordering and collation of the research data. The results of the statistical analysis have been interpreted and are presented below. The first data of interest was the validity of the assumptions made during the research design.

4.2 Assumptions

The response rate expected had a defining role in the number of questionnaires which were delivered; in an attempt to obtain a population of 100, with an estimated response rate of 35%, it was decided that 350 questionnaires would be sent to relevant participants. The number was higher than the mathematical requirement in order to adjust for an amount of responses which would be invalid. The estimated response rate was also higher than some reported response rates, due to the growth effect or 'snowballing' as the email containing the link to the questionnaire also contained a plea to forward the link to other known, relevant associates.

The response rate observed for the questionnaire was lower than the assumed response rate. With an initial sample of 350 participants who were sent the questionnaire, there were only 59 responses. The response rate was 17%. The assumption that only owners of SMEs and SUBs were valid participants meant that only 45 of the 59 responses were valid, this decreased the response rate to 13% as shown in Figure 5, though the response rate could be even lower, due to the snowballing effect growing the number of people who had access to the questionnaire. The low response rate is not a major concern as the primary function of the research is the determination of possible trends, for which statistical relevance is not necessary. It should be noted that no statistical conclusions could be treated as valid, therefore more qualitative conclusions will be drawn.

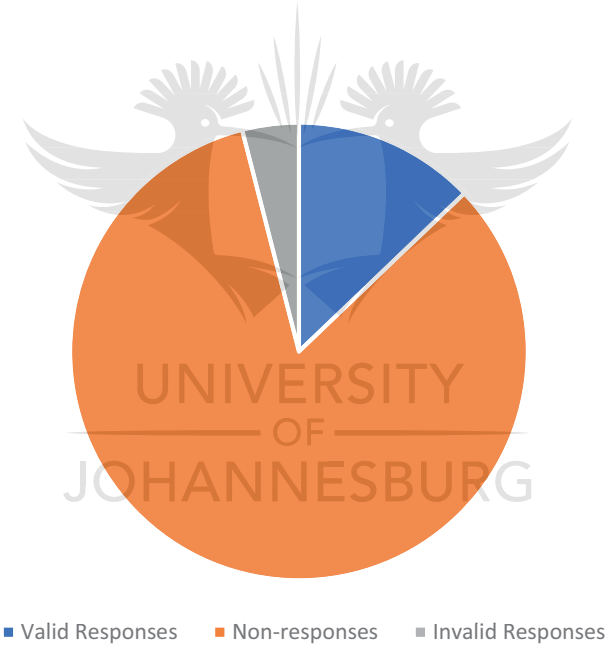

Figure 5: Questionnaire response rate

The low response rate could be attributed to the method of delivery for the questionnaire, email response rates are lower than other forms of delivery (Rolstad, et al., 2011), as well as due to the included plea for forwarding it could have appeared to be a 'chain email' scam to some of the participants. Another potential factor in the

lower-than-expected response rate, could be the natural unwillingness to contribute to research such as this. The unwillingness to participate could be due to the difficulty in realising the potential benefit to the participant or unwillingness to share 'secrets' to success to potential competition. The data collected is therefore from participants who saw benefit to the study, and while there may be a negligible bias to the answers in this case, the data collected is still pertinent and valid for this study.

Another assumption made was that people in controlling roles of businesses would be the most likely to have information on the start-up strategies used in the start-up phase of the businesses. While this assumption is not subjectively false, it meant that many potential participants, who might have been more willing to participate, were excluded.

4.3 Research Links

The research questions developed for this paper, as discussed in Chapter 1, were twofold:

- How are failures of start-up businesses similar to failures of projects?
- Which project management techniques could help improve start-up business success?

The first of these questions was explored in the Literature study of Chapter 2, where it was found that not only are the causes of failure of projects and start-up businesses similar, the environments in which projects and start-up businesses are developed and operated are also comparable.

The similarities allow for the analogy that start-up businesses could be considered a special type of project, and that the correct use of certain project management techniques might improve the chances for start-up businesses to succeed. The analogy leads into the second research question. The first step of which is to determine if any project management techniques, those which have been shown to have a positive effect on project success, are being used by start-up businesses. If these

techniques are being used by start-up businesses, the effect on the success of these businesses is the following point of interest for this study.

The first questions of the questionnaire were used to ensure that valid participants were answering the questionnaire; firstly, that the questionnaire was applicable and secondly, for ethical reasons, the participant had to give consent for the use of the data captured in the questionnaire. The second group of questions was intended to develop a tentative profile of South African entrepreneurs; the experiences of successful and failed businesses. After this, the questionnaire was focussed on the determination of the use of pertinent project management techniques in failed and successful businesses. Lastly, a section on the perceived usefulness of the techniques was included – this allows for an analysis of whether there is an intuitive understanding of the usefulness of the techniques through the use of the techniques.

4.4 Statistics and Results

As discussed above, the first section of the questionnaire was to determine that the participant was part of the valid population for this study. From 59 completed surveys, 45 were found to be valid based on the assumptions, as explored above. The analysis of validity determined that 79% of completed questionnaires were valid for the purposes of this study.

The experience of South African entrepreneurs who took part in the survey varied quite widely. The number of unsuccessful businesses that the participants had been a part of ranged from 0 to 5, with a mean of 0.91 and a standard deviation of 1.15. The number of successful businesses started by the questioned entrepreneurs ranged from 0 to 3, having a mean of 1.13 and a standard deviation of 0.69. Therefore, the average South African entrepreneur has experience in both successful and unsuccessful start-up business (SUB) endeavours, which should provide a better understanding of whether the use of specific techniques would be beneficial.

The number of project management techniques used in the businesses which had been unsuccessful spanned from 0 to 5 in all but one case, in which the participant claimed to have used 9 techniques. The mean number of techniques used in failed businesses was 1.60 with a standard deviation of 1.96, the highest frequency response was 0 techniques used, apparent in 37.8% of the cases of unsuccessful businesses. In successful businesses, the number of project management techniques used varied from 0 to 9, with a mean of 3.36 and a standard deviation of 2.33, the highest frequency of number of techniques used was 4, found in 22% of cases of successful businesses. Figure 6 shows the percentage of participants who used a number of techniques in businesses which were successful and unsuccessful.

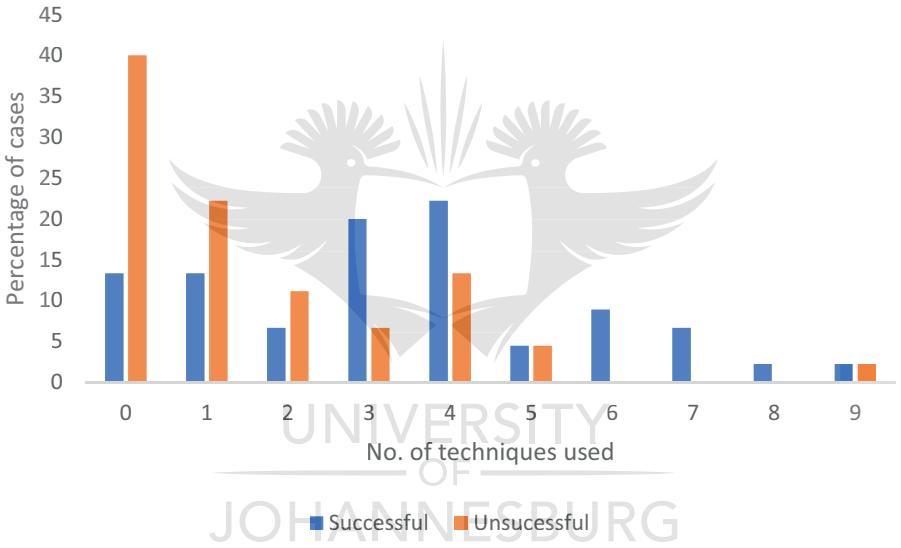

Figure 6: Frequency of number of project management techniques used in successful and unsuccessful businesses

Table 6 shows the percentage of cases in which each project management technique was used, in both successful as well as unsuccessful businesses. As shown in Table 6, the most commonly used project management techniques, in descending order, for unsuccessful businesses were: None, Lessons learned and Analogous estimates. For successful businesses the most commonly used project management techniques were: Checklists, Lessons learned, Analogous estimates and Cost baselines. Two

write-in responses were given for successful businesses and one valid response for unsuccessful businesses. For successful businesses the responses were:

- Keeping check on stock, creditors and debtors, in conjunction with milestone analysis. And developing workflow system to remain efficient.
- Having silent partners with vast experience in start-up businesses.

For unsuccessful businesses the one valid write-in response was: inflating the importance of the cost baseline leading to conflict in the workplace when the cost baseline is exceeded. Table 6 also shows the difference, in use of the project management techniques, between successful and unsuccessful businesses. The difference in use allows for the identification of techniques, which are more present in successful businesses than unsuccessful businesses. The techniques with the largest difference were: Checklists, Communication plans and Contingency plans.

Table 6: Project management techniques used in businesses as a percentage of cases

Technique:	Unsuccessful Businesses:	Successful Businesses:	Difference:
Checklists	20%	60%	40%
Communication plans	4%	33%	29%
Contingency plans	7%	31%	24%
None	38%	16%	-22%
Cost baselines	22%	40%	18%
Milestone analysis	13%	29%	16%
Analogous estimates	27%	40%	13%
Work breakdown structure	18%	31%	13%
Lessons learned	31%	42%	11%
Hierarchical schedules	9%	16%	7%
Critical path method	9%	13%	4%

The final section of the questionnaire asked the participant to rate the effectiveness of each project management technique in helping the business to become successful. The final section used a Likert rating scale from 0 (useless) to 10 (vital). The number 10 was chosen as an arbitrary round number with a decent number of intervals to allow

for a more precise rating. Figure 7 shows the mean of the rating given to each of the project management techniques.

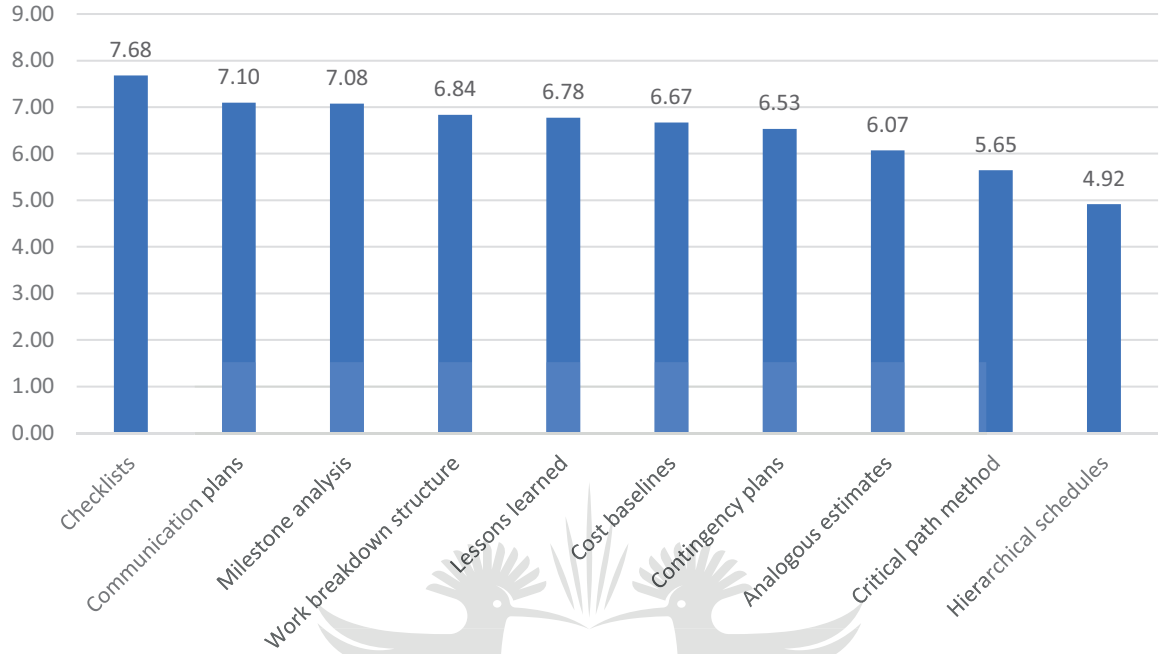

Figure 7: Mean ratings of each project management technique for business success

Table 7 shows the frequency, in percentage of responses, of each chosen rating score for each of the project management techniques. The frequency of the response helps to illustrate any techniques which are contentious, and any which are widely regarded to be useful. The number of scores captured for each project management technique was consistent with the number of respondents who claimed to have used the technique. In Table 7 the two ratings with the highest frequency have been highlighted, showing that the techniques which are controversial; Contingency plans and Critical path method, and the techniques which seem to be generally agreed upon in regard to their usefulness; Checklists, Lessons learned and Hierarchical schedules.

Table 7: Frequency (%) of the rating score chosen for each project management technique

Rating	Analogous estimates	Checklists	Communication plans	Contingency plans	Cost baselines	Critical path method	Hierarchical schedules	Lessons learned	Milestone analysis	Work breakdown structure
Useless	7.3	0	0	2.3	4.8	5.4	5.6	2.5	0	2.7
1	0	0	0	2.3	2.4	2.7	5.6	2.5	0	2.7
2	7.3	4.5	4.9	4.7	2.4	8.1	8.3	12.5	5.3	5.4
3	9.8	4.5	2.4	9.3	11.9	18.9	16.7	5	2.6	2.7
4	4.9	0	2.4	4.7	0	0	2.8	2.5	10.5	2.7
5	17.1	9.1	12.2	18.6	7.1	10.8	25	10	10.5	13.5
6	7.3	4.5	22	4.7	9.5	8.1	5.6	2.5	10.5	5.4
7	2.4	15.9	12.2	7	16.7	16.2	11.1	5	13.2	18.9
8	17.1	20.5	14.6	14	11.9	8.1	8.3	20	10.5	13.5
9	7.3	11.4	4.9	11.6	14.3	8.1	5.6	10	13.2	13.5
Vital	19.5	29.5	24.4	20.9	19	13.5	5.6	27.5	23.7	18.9

4.5 Summary

Online questionnaires were emailed to 350 entrepreneurs and small business owners, with the questionnaire open for responses for 1 month. The data collected from the questionnaire was ordered and collated by UJ Statkon. Although a response rate of 35% was estimated, in order to achieve 100 participants, the actual response rate was seen to be lower than 13%. The lower than expected response rate is partly due to email requests having response rates being lower than other types of data collection methods (Rolstad, et al., 2011). It might also be attributed to the appearance of the request being a 'chain email' scam due to the attempt for snowballing, or participants' difficulty in realising the potential benefit. Despite this, the results are still pertinent and valid for this study as it is an early investigation into the potential existence of a trend between project management technique (PMT) use and success in SUBs. The response rate could also have been increased by not limiting the questionnaire to participants in controlling roles of small to medium enterprises (SMEs).

The first of the research questions was explored in the Literature study, in Chapter 2, showing that the causes of failure and environments of projects and SUBs were comparable and therefore SUBs could be considered a special type of project. As such, the research and subsequent analysis was concerned with the second research question, namely: Which project management techniques could help improve start-up business success?

The average South African entrepreneur involved in the questionnaire had experience in successful and unsuccessful SUB endeavours, and as such could reliably account for techniques used in both cases.

The mean number of techniques used in failed businesses was 1.60, while in successful businesses a mean of 3.36 techniques were used. For unsuccessful businesses the most commonly used project management techniques were: None, Lessons learned and Analogous estimates. The most commonly used project management techniques in successful businesses were: Checklists, Lessons learned, Analogous estimates and Cost baselines.

The techniques which are used more often in successful businesses than unsuccessful businesses were determined through the largest difference in use were: Checklists, Communication plans and Contingency plans. The participants were also asked to rate the usefulness of the techniques in regard to the effect on success, Checklists, Communication plans and Milestone analysis were, on average, considered the most useful. The participants' responses also illustrated techniques which were controversial; Contingency plans and Critical path method, and which techniques they concurred on the level of usefulness; Checklists, Lessons learned and Hierarchical schedules.

5 Conclusion and Recommendations

5.1 Introduction

As a major factor in driving economic growth, small and medium enterprises (SMEs) are important to the global economy (Muhammad, et al., 2010). SMEs contribute 43.5% of all employment globally (Aysan, et al., 2016). An estimated 90% of legal businesses in South Africa are micro, small or medium in size (Smit and Watkins, 2012). South Africa has one of the lowest rates of SME creation in the world, which is alarming, as job creation and economic growth depend on SMEs (Fatoki, 2014). After only two years, eighty percent of South African SMEs fail, this figure increases to 90% in 10 years (Van Scheers, 2011).

A start-up business (SUB) is an early stage of growth and development for a business (My Accounting Course, 2019 A). The natural outcome of a SUB is a SME, created once the business has matured and become stable. The reported reasons that SUBs and SMEs fail are varied (Nemaenzhe, 2010; Crush, et al., 2015). These causes, however can be categorised into three main groups, namely: resources, management and environmental.

A lack or poor handling of finances, information, labour and materials are the causes which fall into resource failures. Management failures include bad decisions which affect the output, focus of the labour and other resources of the company (Chittithaworn, et al., 2010). Lastly, the business and non-business environment can have major effects on a SUB's chances for success.

SUBs can be widely varied in scope, market or output. However there are common causes for failure across almost all of them, and these could define the characteristics of SUBs (Abor and Quartey, 2010; Chittithaworn, et al., 2010; Nemaenzhe, 2010). These characteristics are: limited access to financial resources, any effort not being performed by the entrepreneur must be hired (Debrulle, et al., 2013), specific, limited

materials or information might be required and the entrepreneur is usually the sole management structure.

Many of the SUB failures could have been avoided by the management or stakeholders of the SUB having sufficient experience and knowledge in the area where the failure occurred. The pitfalls experienced by failed SUBs could possibly have been circumvented by experienced or well-informed managers. Management of the SUB is also, possibly, the simplest area to affect improvement on the success rate of the start-up business, as there are fewer external variables and, usually only a few management positions in a SME. Two research problems were determined for this study:

- How are failures of start-up businesses similar to failures of projects?
- Which project management techniques could help improve start-up business success?

In order to answer the first question, a literature study was used to explore the common failures between projects and SUBs.

The definition of a project; an endeavour, with a limited timeframe and budget which results in a singular goal, product or service (Meredith and Mantel, 2012), describes the characteristics of a project. Individual projects are differentiated through their operating constraints, most commonly cost, time and scope (Meredith and Mantel, 2012). The discipline of project management is focussed on increasing the probability that a project will be completed successfully and within its constraints. Project management techniques (PMTs) are tools that have been established to facilitate the goals of project managers; the successful completion of projects (Mir and Pinnington, 2014).

There are three major reported failure causes which are universal to projects, regardless of constraints. Primarily, access to required resources has a major impact on the success of a project (Lehtinen, et al., 2014). Bad governance of a project or the controlling organisation can cause another range of issues affecting the failure rate of projects. Part of these poor management problems is not having clearly defined chains

of accountability and responsibility (Lehtinen, et al., 2014; Batool and Abbas, 2017). Environmental causes from the controlling entity and any relevant social and governmental structures also be a major determinant as to the ongoing viability of a project (ul Musawir, et al., 2017).

The literature study was also used to check the viability of the second question, by determining whether projects and SUBs were comparable enough that the techniques for one may apply to the other. There are strong similarities between the causes of failure of SUBs and projects. Projects and SUBs also share many comparable characteristics. Although the majority of characteristics are shared, there are a few differences, the minor differences occur in the in the management structure and internal environment of projects and SUBs. Despite these differences, an analogy can be drawn between projects and SUBs. The analogy allows for the consideration of SUBs as a special type of project. Therefore, PMTs, that have been shown to increase project success, could also improve start-up business success.

Patanakul, et al. (2010) have shown that not every PMT developed has an impact on project success. Only ten techniques were shown to have an impact on project success, namely: analogous estimates, checklists, communication plans, contingency plans, cost baselines, critical path method, hierarchical schedules, lessons learned, milestone analysis and a work breakdown structure (Patanakul, et al., 2010).

A survey strategy was chosen as the best suited strategy for the desired philosophy, approach and design. Specifically, it was decided that a questionnaire would be used as the method for data collection. The unit of measurement of interest to the study being owners of a SME. The questions were designed around the 10 PMTs discussed by Patanakul, et al. (2010).

Three hundred and fifty questionnaires were electronically distributed in an attempt to achieve a sample of 100 participants for an early exploration into the possibility of an existing trend between SUB success and the use of PMTs. A response rate of 13% of valid, completed questionnaires was observed, resulting in a sample size of 45.

The data collected was analysed and it was found that 38% unsuccessful businesses were started using none of the PMTs, while only 16% of successful businesses had used none of the PMTs. Approximately 65% of successful businesses had used four or more techniques. The most commonly used techniques in successful businesses were: Checklists, Lessons learned, Analogous estimates and Cost baselines. The participants also rated Checklists, Communication plans and Milestone analysis to be the most effective in assisting with SUB success.

5.2 Conclusion

The findings from the questionnaire show the definite possibility of a trend that could exist between the use of PMTs and SUB success. There were more unsuccessful businesses that had used no techniques than successful ones that had used no techniques. This provides some evidence that PMTs could be used to increase the chance of SUB success.

Not all of the techniques were used in any reasonable amount by entrepreneurs who had started successful or unsuccessful businesses. Hierarchical schedules and the Critical path method were the only techniques used in less than 29% of the cases of successful businesses. The use of hierarchical schedules is understandably low for SUBs as a hierarchical schedule is used in a more complex management structure in order to supply relevant information to the recipient (Burke, 2014), while SUBs have a simpler management structure. The lower use of the critical path method could be explained by two phenomena, the relative complexity of the technique and the purpose of the technique. The critical path technique is used in developing a timeframe for the completion of a project and determining the operations which would have an effect on the completion date of the project (Meredith and Mantel, 2012). There are little to no such inflexible time constraints put upon SUBs, and therefore the critical path method is less critical to the success of SUBs.

It is not possible to provide a definitive list or guide on which PMTs should or should not be used during the start-up phase of a business from this research, or possibly even future research. Despite, this it is possible to tentatively suggest some guidelines as to techniques which could be beneficial if used as part of the strategy for SUBs.

5.2.1 Guidelines for Technique Use

The analysis of data in Table 6 allowed for the determination of which techniques are used more often in the start-up phase of successful businesses than in unsuccessful businesses. One of the major differences between the two is the use of no techniques, being more prevalent in failed businesses than successful ones, therefore it is not recommended to use no developed techniques when starting a business, though it is possible for a business to succeed despite the absence of the techniques. The lack of use of any techniques could also point to a lack of planning during the SUB's inception. The three techniques with the highest difference in use are all linked with the planning phase.

The use of checklists had the largest increase in use between successful and unsuccessful businesses, showing an increase of 40% between the two. This could be due to the simplicity of the method and the potential natural link between the planning the business and developing a checklist. The required planning, ease and increase in use found from the research, means that, at minimum, the use of checklists is highly recommended.

Communication plans showed the second highest increase when unsuccessful and successful businesses were compared. A communication plan is a useful document which allows for the efficient distribution of relevant information to the parties which require it. A communication plan minimises unnecessary communication and highlights the importance of the communicated information (Meredith and Mantel, 2012).

Contingency plans, or backup plans, require the consideration of alternatives, this could allow for the discovery of alternatives which are better than the initial selection, improving the original plan. The contingency plans also provide strategies for when the primary plan didn't succeed or was prevented by an incident.

While the use of cost baselines, analogous estimates and a lessons-learned document did not increase a great deal, this is partly due to the already relatively high use in unsuccessful businesses. However, the use of these techniques in unsuccessful businesses does not indicate that the techniques are worthless, only perhaps insufficient when used without other techniques or used incorrectly.

The correct use of milestone analysis and work breakdown structures is not achieved easily. The relatively low use of these techniques may attest to the complexity of the proper use of these powerful techniques. These techniques are probably not vital to the success of a business; however, the proper use of these techniques may provide useful information to the entrepreneur.

As discussed, the use of the critical path method and hierarchical schedules may be inappropriate for SUBs. If these techniques could be tailored to better suit SUBs, they might prove to be more useful. There may also be other techniques, which have lesser effects on project success, which were not investigated in this study that could benefit entrepreneurs.

5.3 Further study

Other PMTs not investigated by this study may have an impact on the success of SUBs. A more thorough investigation into the techniques used by entrepreneurs could be of merit, maybe even identifying potential techniques to be used in project management. The effectiveness of a wider range of PMTs on the success of SUBs would also be of use in expanding the guidelines of techniques that could increase the success of SUBs. A study into the effectiveness of the proposed techniques as well as any future techniques included in the guidelines is also suggested, this could be

used in an attempt to develop and fine tune the recommended techniques to suit SUBs.

5.4 Summary

Small and medium enterprises (SMEs) are vital to growth of the global economy (Muhammad, et al., 2010). South Africa has one of the lowest rates of SME creation in the world and eighty percent of South African SMEs fail within two years (Van Scheers, 2011).

Projects and start-up businesses have been shown to be similar enough to allow for an analogy to be drawn between projects and start-up businesses (SUBs). Therefore, project management techniques tables), that have been shown to increase project success, could potentially improve start-up business success.

Patanakul, et al. (2010) have shown that not every PMT developed has an impact on project success. The techniques which impacted project success were: analogous estimates, checklists, communication plans, contingency plans, cost baselines, critical path method, hierarchical schedules, lessons learned, milestone analysis and a work breakdown structure (Patanakul, et al., 2010)

A survey strategy was chosen for an early exploration into the possibility of an existing trend between SUB success and the use of PMTs. It was found that 38% of unsuccessful businesses had used none of the PMTs, while this was the case in only 16% of successful businesses.

The findings from the questionnaire show the definite possibility of a trend that could exist between the use of PMTs and SUB success. The use of project management techniques in start-up businesses is recommended. The use of checklists is highly recommended as the required business planning, ease of use and increase in use found from the research could be useful in increasing business success.

Communication plans, contingency plans, cost baselines, analogous estimates and a lessons-learned document are also recommended to further increase the probability of business success. The use of milestone analysis and work breakdown structures could provide useful information, but must be undertaken with care. The research

found that the use of the critical path method and hierarchical schedules may be inappropriate for SUBs.

Further research is recommended with regard to the use of other PMTs not investigated by this study, a study into the effectiveness of the proposed techniques as well as development of the recommended techniques to suit SUBs.

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Appendix A: Questionnaire

RB Rhodes UJ Masters Dissertation

Data collection on project management techniques used in the start-up of South African businesses

* Required

1. **Have you had a controlling role in the start-up process of one or more businesses in South Africa?** *
   Mark only one oval.
   - ◯ Yes
   - ◯ No *After the last question in this section, stop filling out this form.*

2. **Do you consent to the collection of data, pertaining to the use of project management techniques in the start-up phase of a business?** *
   Mark only one oval.
   - ◯ Yes
   - ◯ No *Stop filling out this form.*

Successful vs unsuccessful

3. **How many of the businesses, which you started up, were successful in becoming stable and profitable?** *

4. **How many of the businesses were unsuccessful in becoming stable and profitable?** *

Successful Businesses

The project management techniques used in successful businesses

5. **Which project management techniques were used in the start-up of the successful businesses?** *
   Check all that apply.
   - ☐ Analogous estimates - estimates of the cost, timetable and cash-flow from similar businesses
   - ☐ Checklists - a list of "to-do"s that get crossed off as they are completed
   - ☐ Communication plans - a predetermined plan of contacts for specific situations
   - ☐ Contingency plans - a predetermined plan of actions or alternatives if the initial plan doesn't work
   - ☐ Cost baselines - a time vs cost graph comparing budget to actual costs
   - ☐ Critical path method - A schedule of all linked "to-do"s with their lengths, where the longest "path" highlighted
   - ☐ Hierarchical schedules - Different schedules for different levels, e.g. a detailed schedule for the CEO and a less detailed schedule for workers
   - ☐ Lessons learned - First-hand knowledge from previous businesses or start-ups
   - ☐ Milestone analysis - Analysing the business at certain, specific predetermined points
   - ☐ Work breakdown structure - A list of big jobs, broken down into smaller and smaller steps
   - ☐ None
   - ☐ Other: _____

Unsuccessful Businesses

The project management techniques used in unsuccessful businesses

6. **Which project management techniques were used in the start-up of the successful businesses?** *

Check all that apply.

- [ ] Analogous estimates - estimates of the cost, timetable and cash-flow from similar businesses
- [ ] Checklists - a list of "to-do"s that get crossed off as they are completed
- [ ] Communication plans - a predetermined plan of contacts for specific situations
- [ ] Contingency plans - a predetermined plan of actions or alternatives if the initial plan doesn't work
- [ ] Cost baselines - a time vs cost graph comparing budget to actual costs
- [ ] Critical path method - a schedule of all linked "to-do"s with their lengths, where the longest "path" is highlighted
- [ ] Hierarchical schedules - different schedules for different levels, e.g. a detailed schedule for the CEO and a less detailed schedule for workers
- [ ] Lessons learned - first-hand knowledge from previous businesses or start-ups
- [ ] Milestone analysis - analysing the business at certain, specific predetermined points
- [ ] Work breakdown structure - a list of big jobs, broken down into smaller and smaller steps
- [ ] None
- [ ] Other: _____

Usefulness of Project Management Techniques

Your opinion on how useful each of the techniques was in the success of the start-up businesses

7. **Analogous Estimates - estimates of the cost, timetable and cash-flow from similar businesses**

Mark only one oval.

	0	1	2	3	4	5	6	7	8	9	10	
Useless	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Vital

8. **Checklists - a list of "to-do"s that get crossed off as they are completed**

Mark only one oval.

	0	1	2	3	4	5	6	7	8	9	10	
Useless	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Vital

9. **Communication Plan - a predetermined plan of contacts for specific situations**

Mark only one oval.

	0	1	2	3	4	5	6	7	8	9	10	
Useless	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Vital

10. **Contingency Plan - a predetermined plan of actions or alternatives if the initial plan doesn't work**

Mark only one oval.

	0	1	2	3	4	5	6	7	8	9	10	
Useless	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Vital

11. **Cost Baseline - a time vs cost graph comparing budget to actual costs**
Mark only one oval.

	0	1	2	3	4	5	6	7	8	9	10	
Useless	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Vital

12. **Critical Path Method - a schedule of all linked "to-do"s with their lengths, where the longest "path" is highlighted**
Mark only one oval.

	0	1	2	3	4	5	6	7	8	9	10	
Useless	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Vital

13. **Hierarchical Schedules - different schedules for different levels, e.g. a detailed schedule for the CEO and a less detailed schedule for workers**
Mark only one oval.

	0	1	2	3	4	5	6	7	8	9	10	
Useless	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Vital

14. **Lessons Learned - first-hand knowledge from previous businesses or start-ups**
Mark only one oval.

	0	1	2	3	4	5	6	7	8	9	10	
Useless	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Vital

15. **Milestone Analysis - analysing the business at certain, specific predetermined points**
Mark only one oval.

	0	1	2	3	4	5	6	7	8	9	10	
Useless	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Vital

16. **Work Breakdown Structure - a list of big jobs, broken down into smaller and smaller steps**
Mark only one oval.

	0	1	2	3	4	5	6	7	8	9	10	
Useless	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Vital