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INVESTIGATING THE RELATIONSHIP BETWEEN PROJECT SUCCESS AND ENTREPRENEURIAL PERFORMANCE

By

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DECLARATION

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I declare that the doctoral thesis which I hereby submit is my own work. All the sources used or quoted have been indicated and acknowledged by means of complete references.



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DEDICATION

I dedicate this thesis to my son, Stefan Snyman.

You shared my tears, frustration and countless moments of despair.

It would not have been possible for me to achieve this without your love, support and belief
in me.

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"If I have seen further, it is by standing upon the shoulders of giants."

Sir Isaac Newton

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ABSTRACT

Change, innovation and entrepreneurial action form the ethos of a Fourth Industrial Revolution organisation, which requires a relevant and successful transformation of resources to ensure the organisation's survival in turbulent economic times. To this end, this study was conducted to provide project and entrepreneurial managers with knowledge relevant to the Fourth Industrial Revolution.

Because most organisations use project management practices to realise their strategic and business objectives, the success of these projects is fundamental to their performance since projects convert goal-directed action into forceful motion. Project-oriented organisations, such as engineering, IT, innovation projects, new product development and professional services, experience increased complexity in their projects. Therefore, to stay competitive, they must pay more attention to increasing the success of these projects. However, success means different things to different stakeholders. This research interpreted project success in the context of efficiency, impact on the customer, impact on the team, business and direct success, and preparation for the future. This approach allows organisations to assess the project's success in a broader context than time, cost and quality. Entrepreneurial performance represents the degree and frequency of an organisation's activities. This study evaluated performance against company and decision-making characteristics and new product, service and process introductions. These aspects of entrepreneurial performance allow the organisation to develop and evaluate actions that will result in a competitive advantage.

Contemporary literature has yet to definitively study the relationship between entrepreneurship and project practice. Therefore, this study contextualised project success's formative power and investigated entrepreneurial performance from a different, more dynamic perspective.

Success and performance are approached differently, suggesting that project success directly affects an organisation's entrepreneurial performance. Based on this premise, a conceptual model was developed to test this hypothesis. Project risk was also presented as a moderator of the relationship between project success and entrepreneurial performance.

The success of a project is greatly determined by the level of risk and how risk affects an organisation's performance. Through quantitative research, a survey method was used to collect data, and a sample of 369 participants was obtained from project-oriented organisations. The hypothesised relationships between constructs were tested through structural equation modelling to explain the variance in the dependent variable (entrepreneurial performance). The main research results indicated a positive relationship between project success and entrepreneurial performance.

A significant contribution of this study is to narrow the gap between project practice and entrepreneurship in the interdisciplinary research literature.

Keywords: Project success, entrepreneurial performance, project risk, moderating and structural equation modelling

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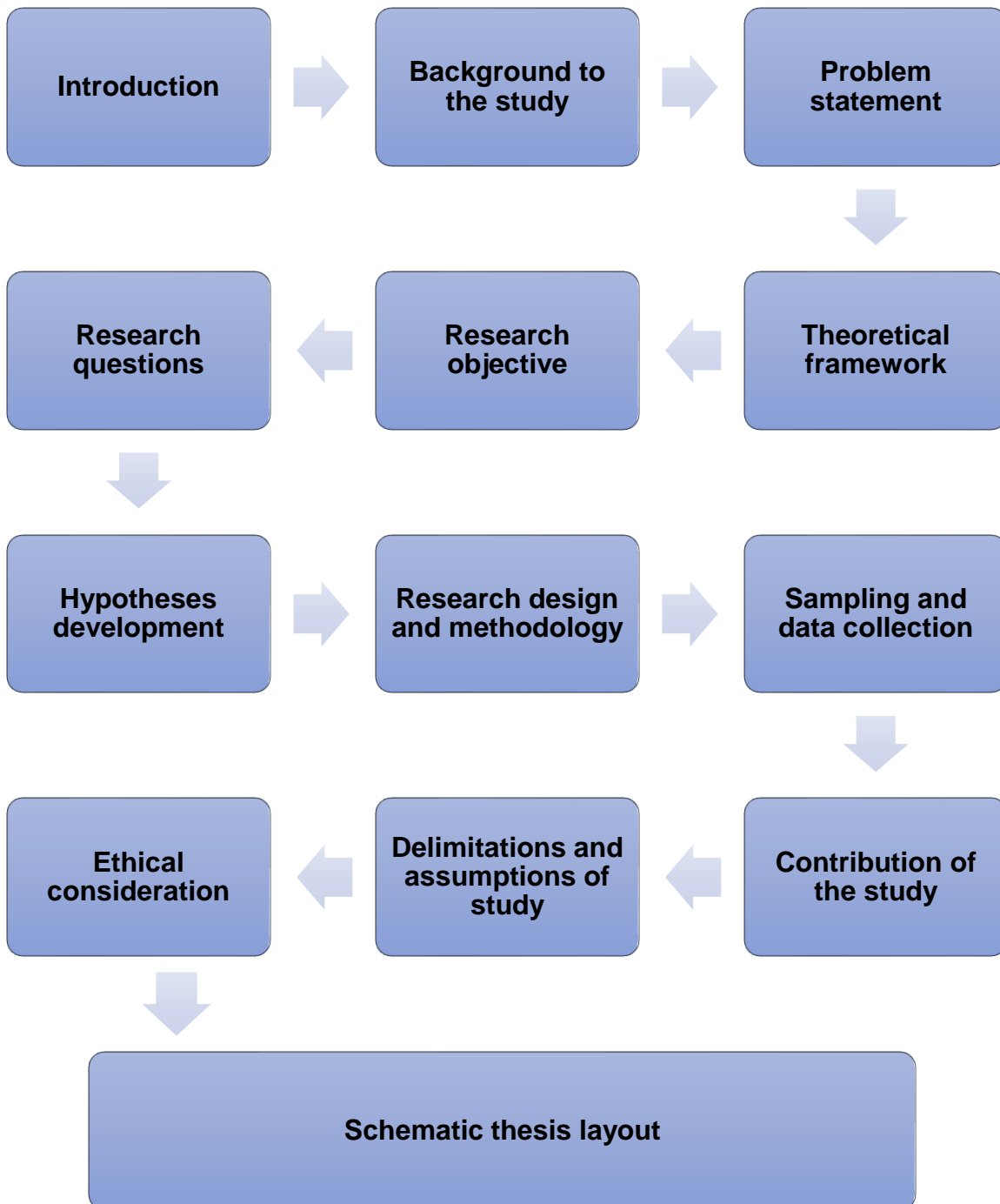
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LIST OF ABBREVIATIONS

AVE	Average Variance Extracted
CC	Company Characteristics
CP	Customer Perception
DV	Dependent Variable
EFA	Exploratory Factor Analysis
EP	Entrepreneurial Performance
EO	Entrepreneurial Orientation
IEA	Improved Entrepreneurial Action
IV	Independent Variable
KMO	Kaiser-Meyer-Olkin
NTCP	Novelty-Technology-Complexity-Pace
MV	Moderator Variable
PC	Project Characteristics
PP	Project Performance
PT	Project Team
PLS-SEM	Partial Least Squares Structural Equation Modelling
SEM	Structural Equation Modelling

CHAPTER 1

CONTEXTUALISATION OF THE STUDY



1.1 INTRODUCTION

The Greek philosopher Heraclitus of Ephesus (535–475 BC) once stated: “There is nothing permanent except change”, which encapsulates the fundamental characteristics that will form the ‘new’ reality of the entrepreneur in the Fourth Industrial Revolution, which is change (Stander, 2018:8). Adaptability to change will be one of the entrepreneur’s core characteristics of survival. Change, innovation and entrepreneurial action must form the ethos of organisational transformation to be relevant, successful and, more so, to survive the turbulent economic environment in which they perform.

Frequently, the term *entrepreneurial* is used as an adjective to describe people, projects or organisations (Morris, 2015:1). In contrast, various phrases such as entrepreneurial orientation (EO), entrepreneurial intensity, entrepreneurial projects and entrepreneurial performance are commonly used to describe entrepreneurial action in established organisations (McMullen, Brownell & Adams, 2021:1178; Vicentini, Peruffo, Meissner & Mueller, 2019:387–388). Even though entrepreneurship as a phenomenon can be traced back to the 12th century (Ferreira, Fernandes & Kraus, 2019:185), it has only been during the last 40 years that entrepreneurship has gained credence as a formal research discipline (Carlsson, Braunerhjelm, McKelvey, Olofsson, Persson & Ylinenpää, 2013:913; Linton, 2016:15).

However, it is not only in terms of academia that entrepreneurship has excelled; there is also a large body of knowledge emphasising the positive and significant role entrepreneurship has played in economic growth (Barba-Sánchez & Atienza-Sahuquillo, 2017:1098; Bosma, Sanders & Stam, 2018:483; Di Muro & Turner, 2018:968; Smith & Chimucheka, 2014:160; Van Vuuren & Alemayehu, 2018:1). Similarly, project management and its practices are the most commonly used organisational strategic approaches to achieve predefined organisational (change) objectives ((Di Muro & Turner, 2018:969; Gemünden, Lehner & Kock, 2018:147; Lévesque & Stephan, 2020:164). Moreover, organisations should consider corporate strategy in the context of projects. This is because organisations are becoming increasingly aware of the importance of projects and how they relate to their performance (Frefer, Mahmoud, Haleema & Almamlook, 2018:1).

Even though the relationship between entrepreneurship and projects may be robust and well-founded, the two domains have been studied in parallel but on separate paths (Kuura, Blackburn & Lundin, 2014:214). Therefore, the potential links between the two disciplines can be exploited. This study argued that both practical and theoretical perspectives can prove helpful in exploring the conceptual links between the two disciplines. Based on these arguments, this study investigated whether entrepreneurial performance (the dependent variable) is influenced by project success (the independent variable) and to what degree the relationship between the two variables is affected by project risk (moderator variable) (Shad, Lai, Fatt, Klemeš & Bokhari, 2019:416). This study contributes to the literature by investigating the potential relationship between two interdisciplinary research domains: project success and entrepreneurial performance in South African project-oriented organisations. The research results can potentially inform projects and entrepreneurship practitioners about how these two variables interact. This ensures that organisations realise their strategic objectives for sustainable competitive advantage.

This study presented a formal research design consisting of a literature review and empirical research (Bell, Bryman & Harley, 2019:161; Oosthuizen, 2018:1). To answer the research questions posed and test the subsequent hypotheses, the researcher developed a conceptual model to predict how entrepreneurial performance is influenced positively by project success, taking into consideration the moderating effects of project risk (Oosthuizen, 2018:1). Information was obtained from the overall body of knowledge elaborating on project success and its various constructs. In addition, the literature review included discussions on entrepreneurial performance in the context of EO. In the empirical/quantitative phase, 370 questionnaires were issued to various organisations operating in South Africa. Of these, 369 questionnaires could be used for data processing. The questionnaires were issued to employees operating in project-oriented organisations at various managerial levels in diverse industries. Based on the literature review findings, the hypothesised framework evaluates the relationship between project success and entrepreneurial performance. Subsequently, structural equation modelling (SEM) was incorporated to test and evaluate the validity and reliability of the hypothesis framework (Oosthuizen, 2018:1).

In summary, Chapter 1 presents a short introduction and overview of the study's theoretical background and a description of the research problem. The research questions posed were addressed by testing the hypotheses presented in the conceptual model to ensure that the

purpose and objectives of the research were achieved. Important constructs and terminology and a brief description of the research methodology applied in the study are explained, from which the justification for conducting the study was deduced by highlighting the theoretical and practical contributions of the research (Oosthuizen, 2018:2).

1.2 BACKGROUND TO THE STUDY

There is an underlying belief and general consensus that commerce has changed from an industrial socioeconomic class to a project-oriented sector, where (temporary) project organisation has become more prevalent (Berssaneti & Carvalho, 2015:638; Martens, Machado, Martens, Quevedo-Silva & de Freitas, 2018:256). Moreover, contemporary organisations consider projects and project management as critical factors to achieve the required changes that will result in success and sustained performance (Fonrouge, Bredillet & Fouché, 2018:6). Research on the behavioural aspects of entrepreneurship generally focuses on actively looking for profitable opportunities. In this context, Audretsch (2012:761; 2017:5) addresses two crucial aspects of entrepreneurial behaviour: the skill to recognise opportunities and, more importantly, the ability to exploit the opportunity by transforming it into a sustainable, profitable output (Davies & Van Vuuren, 2021:456; Kuckertz, Kollmann, Krell & Stöckmann, 2017:78).

While entrepreneurship and project management may seem very different from an academic and practical perspective, these fields have much more in common than might be believed at first (Trokić, 2016:1). Seminal and influential literature on entrepreneurship and project management over the past 30 years emphasises the need to bring about change and that the actions must be innovative and subject to environmental uncertainties (Lindgren & Packendorff, 2011: 46-51; Shane, 2012:12; Shane & Venkataraman, 2000:220; Turner & Müller, 2003:1).

In their landmark study, Shenhar and Dvir (2007:3) argue that business-oriented projects afford a competitive advantage through innovation and strategic change, which generate a sense of urgency for goal-directed action. Moreover, global business trends mean customers are used to quality and efficiency and take these business attributes for granted rather than viewing them as a unique advantage. For that reason, organisations are opting for sustainable innovation and growth rather than streamlining their operations (Shenhar &

Dvir, 2007:23). Simply put, project success can contribute to the organisation's performance based on the influence these successes have on the organisation's results, for example, innovation, efficient use of resources and growth (Martens *et al.*, 2018:256). Therefore, it is crucial for contemporary organisations to develop the ability to manage projects successfully and use the advantages of project methods, which will improve their competitiveness and lead to success in the current competitive markets (Yang, 2019:1).

Furthermore, several seminal studies have declared the entrepreneurial act similar to the fundamental characteristics of a project, that is, temporary by nature (Belfort, Martens & de Freitas, 2016:407; Lindgren & Packendorff, 2003:86; Morris & Kuratko, 2002:288; Ramirez-Portilla, 2013:22). Like projects, entrepreneurial acts are unique and complex processes constrained by finite time, scope and resources. This is depicted in the pioneering research by Lindgren and Packendorff (2003:87) on the subject. Kuura and Lundin (2019:25) argue that projects and entrepreneurial activities are firmly linked in the 'real world'.

From a scientific perspective, Kuura *et al.* (2014:219) maintain that both fields share similar historical significance based on their unique theoretical nature and professional status. Although these fields coexist within the boundaries of the permanent organisation, it is more a case of "segregated communities" (Kuura *et al.*, 2014:214). Vicentini *et al.* (2019:387) make the point that organisations are often required to act in an 'ambidextrous' way, meaning that organisations are constantly tasked to explicitly and simultaneously manage exploitation and exploration of the markets on a business (strategic) and operations level (project).

To bring more synergy and coherence to these concepts, Turner (2018:232) distinguishes between project-based and project-oriented organisations. He suggests that project-based organisations work from the bottom up, implying that the work performed takes place within the scope of projects. In contrast, a project-oriented approach is top-down, a strategic tactic that validates projects as its business philosophy (Miterev, Mancini & Turner, 2017:479). This study examined project entrepreneurship in the context of a project-oriented organisation.

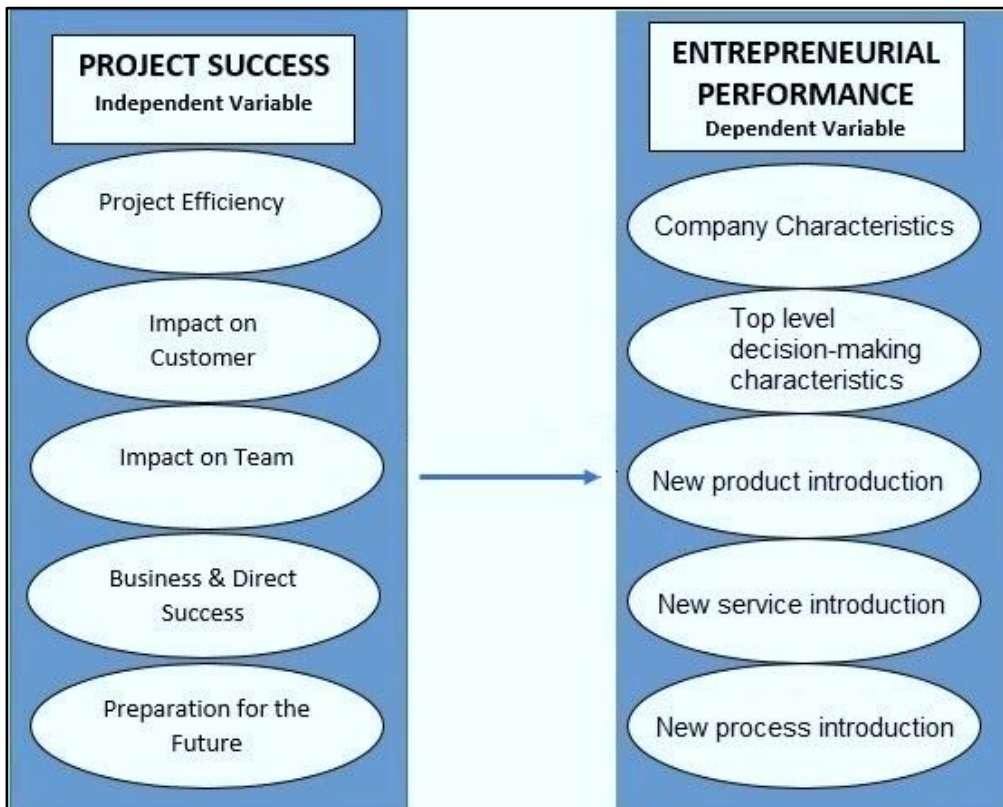
Suitable projects must be undertaken in a project-oriented organisation, the project results must be sustainable and all stakeholder value-creation objectives must be met (Gemünden *et al.*, 2018:150). Therefore, from an institutional perspective, management is “focused on creating the conditions to support and foster projects, both in its parent organisation and its external environment” (Morris & Gerald, 2011:20). Morris (1994:217) argues that despite being reasonably more mature, practically and theoretically, project management is still stuck in a 1960s mentality because many project managers, especially those who teach and consult them, generally have a narrower view of the subject compared to middle managers; thus, they do not address the more significant and strategic issues that affect the success of projects (Pinto & Winch, 2016:237).

On the other hand, EO serves as a strategy that influences entrepreneurial activity regarding innovation and business growth. In other words, an EO emphasises taking risks, being proactive and innovating to increase business opportunities (Davies & Van Vuuren, 2021: 456). Several studies make the connection between EO and organisational performance from various perspectives. Hernández-Perlines, Ibarra Cisneros, Ribeiro-Soriano and Mogorrón-Guerrero (2020:2305) consider EO in relation to innovativeness. In contrast, Linton and Kask (2017:169) call for a more comprehensive perspective by investigating EO postures and firm-level competitive strategy. Furthermore, Zehir, Can & Karaboga (2015:359) highlight the EO and financial performance relationship, among others.

This study concurred with the formative paper by Rauch, Wiklund, Lumpkin and Frese (2009:762), which defines EO as “the entrepreneurial strategy-making process that key decision-makers use to enact their firm’s organisational purpose, sustain its vision and create competitive advantage(s)” (Pinto & Pinto, 2021:158).

Even though project management and entrepreneurship research have become increasingly popular and advanced significantly, hardly any research has explored the relationship between them and their variables (Martens *et al.*, 2018:256). Furthermore, Kock and Gemünden (2016:11) postulate that EO is a vital contingency factor in performance. However, there remains a research gap in project success and EP. Based on the information presented in this study, it can be concluded that there is a *prima facie* case to investigate the relationship between project success and EP, as depicted in Figure 1 (p. 7). The rationale of the diagram is explained in the subsequent sections.

Figure 1: Concept model



Source: Author's compilation.

1.3 LITERATURE REVIEW

Figure 1 illustrates the theoretical relationship between the two constructs, which assumes a positive relationship between project success and EP. In the context of this research, project success is based on five dimensions: project efficiency, impact on the customer, impact on the team, business and direct success, and preparation for the future (Shenhar & Dvir, 2007:26).

This study incorporated the project success assessment instrument, as developed by Shenhar and Dvir (2007:219), which measures the strategic and tactical aspects of project success in the short and long term. EP in this study was based on Morris and Kuratko's (2002:290–294) research. It consists of five dimensions: company characteristics, top-level decision-making characteristics, new product introduction, new service introduction and new process introduction.

Morris and Sexton (1996:9), and later Morris and Kuratko (2002:291), developed the Entrepreneurial Performance Index. The instrument gauges the entrepreneurship intensity of an organisation by measuring its EO based on innovation, risk-taking, a proactive attitude and its product, service or process innovation (Ladzani & Van Vuuren, 2002:15 3; Subedi, 2021:172).

In addition, project risk was incorporated as a moderator to determine how and to what extent the moderator strengthens, diminishes or negates the relationship between the dependent and independent variables (Allen, 2017:2). “The moderator effect is a dependency relation between one variable and another; in other words, it helps clarify what an effect depends on or for which groups an intervention is effective” (Gómez, Schallock & Verdugo, 2020:379). According to this philosophy, project risk contributes to the success of a project and, in turn, impacts the organisation’s performance (Urbański, Haque & Oino, 2019:27).

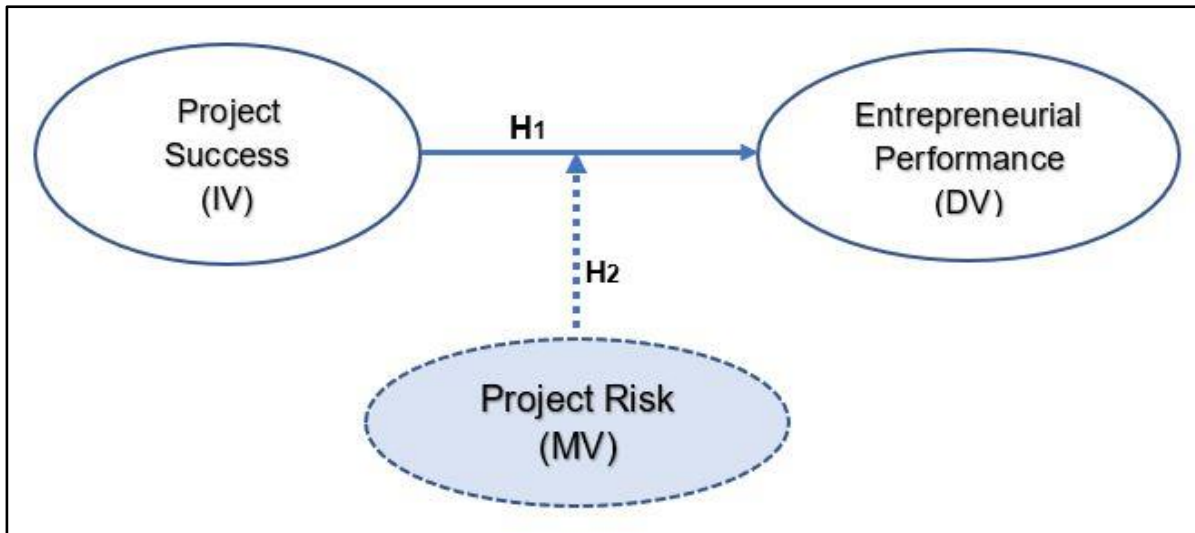
Zwikael, Pathak, Singh and Ahmed (2014:436) consider risk a significant moderator of project success. In addition, the management of project risk reflects the organisation’s competence level in embracing the risk-focused approach and, in this way, directly correlates with the organisation’s advancement (Hartono, Wijaya & Arini, 2019:1). A crucial objective of engaging project risk management is the improvement of organisational performance (Urbański *et al.*, 2019:27). Over the past few decades, risk management has been viewed narrowly and treated in silos. With this fragmented view, organisations focus on specific risk events that could be mitigated. However, in recent years, the organisation has emphasised an all-inclusive risk management approach (Fraser & Simkins, 2016:689).

Shenhar and Dvir (2007:174) developed a method for calculating risk through a simple formula based on the assumption that a numerical value can be assigned to quantify the levels of risk for each dimension. This study used the project classification instrument of Shenhar and Dvir (2007:224) to measure how organisations perceive their project risk in terms of project novelty, technology, complexity and pace.

To the extent of the researcher’s knowledge, no study has empirically investigated the moderating role of project risk on the relationship between project success and EP.

Figure 2 depicts the moderating influence of project risk on the relationship between project success and EP.

Figure 2: Project risk as moderator for the relationship between project success and EP



DV: dependent variable, IV: independent variable and MV: moderator variable.

Source: Author's compilation.

Several scholars have investigated project risk as a moderator of the relationship between planning and project success (Ahimbisibwe, Tusiime & Tumuhairwe, 2015:71; Khan, Saher & Yunis, 2019:220; Urbański *et al.*, 2019:27; Zwikael *et al.*, 2014:438). While Maqsoom, Hamad, Ashraf, Thaheem and Umer (2020:2453) studied the moderating role of risk complexity on various control modes and project performance. Further, Zailani, Ariffin, Iranmanesh, Moeinzadeh and Iranmanesh (2016:347) consider risk a moderator for the relationship between delay causes and project performance.

Shenhar and Dvir (2007:172) state that project practitioners often fail or neglect to identify the cause of the expected risk and its subsequent impact on the organisation's performance. Urbański *et al.* (2019:24) argue that organisations that incorporate risk into their strategic approach report more positive performance. Early identification of risks before starting a project is crucial for successful completion (Urbański *et al.*, 2019:27).

Project risk management is critical for most organisations, directly impacting profitability, efficiency and sustainability (Shad *et al.*, 2019:416). Shenhar and Dvir (2007:173) propose a diamond framework model as a rigorous tool to measure project risk quantitatively.

For a project to succeed, risk factors such as complexity, technological uncertainty, project size, pace and novelty should be considered (Ahimbisibwe *et al.*, 2015:70).

In conclusion, this study gives context to the formative power of project success to analyse EP from a different and dynamic perspective. Theoretically, this study can contribute to the knowledge of two separate but related study fields. This is done by establishing how project risk moderates the relationship between project success and EP.

1.4 PROBLEM STATEMENT

The challenges a 21st-century organisation faces include volatile markets, insufficient strategic foresight, poor performance and general corporate inertia. Therefore, the most relevant topic in any industry is developing initiatives to improve firm performance in the face of environmental uncertainty (Gupta & Wales, 2017:52; Umrani, Kura & Ahmed, 2018:60).

Contemporary organisations often have to contend with slow (weak) growth and global competition in a fast-paced and uncertain market environment. Improving firm performance, therefore, becomes a fundamental issue. In such an uncertain environment, organisations must establish a competitive advantage and, more importantly, sustain it. For decades organisations have tried to identify factors influencing their performance based on success as a central phenomenon (Gao, Ge, Lang & Xu, 2018:178; Köseoglu, Altin, Chan & Aladag, 2020:1). McKenny, Short, Ketchen, Payne and Moss (2018:506) state: “Organisational ecology research suggests that environmental forces influence the strategies and structures that will be successful in an environment.”

However, Hjelmbrække, Klakegg and Lohne (2017:61) argue that having a strategy does not equate to performance. Moreover, Kopmann, Kock, Killen and Gemünden (2017: 557) contend that strategy implementation is a self-governing activity and generally does not get the same attention from top management compared to strategy formulation.

Kuratko and Morris (2018:51) state that for corporate entrepreneurship to succeed, the organisation needs to support and develop more entrepreneurial action; however, without top management’s support and well-formulated entrepreneurial strategies, entrepreneurial action will not evolve into performance.

Even though an argument can be made for the correlation between an organisation's EP and its competitive strategy (Hernández-Perlines, Moreno-García & Yañez-Araque, 2016:5383), and entrepreneurial action being essential when perusing new opportunities, this may not be sufficient. Research conducted by Donbesuur, Boso and Hultman (2020:159) indicates that organisations should direct their entrepreneurial strategic attitude towards "actionable entrepreneurial opportunity exploitation". A strategy is fundamental to understanding what action is required to address various EP problems organisations face (Gao *et al.*, 2018:180).

Despite the universality of time, scholars of organisational studies have been slow to include the phenomenon of temporality in organisational research (Roe, Waller & Clegg, 2008:677). Time is often considered self-evident as an aspect of organisational change; however, it is seldom explained or explored (Dawson, 2014:287). Time is a significant component of strategy, organisational performance and survival because time is a central phenomenon in strategic change. Moreover, it has been argued that time is central to strategy in high-velocity markets, where competitive advantage is notoriously volatile. Therefore, the timing of strategic change, how often and fast it happens, and how events unfold during strategic change are crucial (Kunisch, Bartunek, Mueller & Huy, 2017:1005–1006). Thus, considering time as a resource offers a helpful starting point. It opens up the possibility of multiple temporalities, which can help the organisation manage its activities (Lévesque & Stephan, 2020:163).

Packendorff and Lindgren (2014:9) claim that the entrepreneurial process can be characterised as boundary work, implying that in its process of identifying new opportunities, the organisation will sometimes be required to break with institutional patterns, thereby temporarily deviating from what is taken for granted in organisational cultural settings. Organisations are confronted with typical entrepreneurial problems when embarking on new project opportunities. Even though project management differs from entrepreneurship in practice, both require coordination of time, scope and resources as part of a temporary process (Kuura *et al.*, 2014:214). Therefore, knowledge building is hampered by a lack of segregation between these research disciplines. Contemporary research investigating the gap between entrepreneurship and project practice has been, for the most part, underplayed even though entrepreneurship in practice often suggests project activities, practices, approaches and competencies (Ramirez-Portilla, 2013:1).

Allowing for a shift in perspective, investigating EP in the context of projects could contribute to the empirical theory of entrepreneurship. However, the literature on the relationship between entrepreneurship and project practices is meagre. Furthermore, what constitutes a project practice in entrepreneurship in terms of performance? Therefore, a need exists to investigate the relationship through quantitative empirical research (Berends, Jelinek, Reymen & Stultiëns, 2014:617; Oosthuizen, 2018:14).

Project management methods can play a significant role in influencing innovation and growth in the entrepreneurial process in order to resolve these issues and challenges. Considering the research problem, a predictive model was developed and tested in this study, to establish:

- to what extent does project success impact or contribute to the organisation's EP?
- whether project success inform entrepreneurial project practitioners on how to identify and assess project risk to ensure project success in line with the overall strategy and objectives of the organisation?

1.5 THEORETICAL FRAMEWORK

Grant and Osanloo (2014:13) compare a dissertation's theoretical framework to a blueprint. They argue that a theoretical framework is an essential element of a dissertation, as it is the foundation for clarifying the underlying philosophy, epistemology and methodology, and analytical approach. Across disciplines, various theories exist, and more are being developed and applied constantly. Although no single appropriate dissertation theory exists, some theories are more prevalent and appropriate for a specific discipline (Grant & Osanloo, 2014:14).

This study adopted a theory of the temporary organisation, contingency theory and resource base theory as its theoretical framework. Notwithstanding the advancement in various theories related to entrepreneurship and affiliated disciplines, the literature reveals that entrepreneurship and project management studies do not identify a specific theoretical framework (Arend, 2020:1; Di Muro & Turner, 2018:968; Hanisch & Wald, 2012:4), despite the increased interest in how organisations identify and exploit opportunities that will

increase competitive advantage and sustained growth. That being the case, this researcher aimed to establish how these theories relate and contribute to this research.

1.5.1 Theory of the temporary organisation

“A project is a temporary endeavour undertaken to create a unique product, service, or result” (Project Management Body of Knowledge (PMBOK), 2013:3). For this thesis, the primary argument for adopting a theory of temporary organisation was the assumption that entrepreneurship and projects are similar, based on their actions and shared objective to bring change through innovation (Di Muro & Turner, 2018:970). Some scholars argue that innovation has not occurred if the entrepreneurial process does not bring about change (Audretsch, 2012:757; McMullen, 2015:1; Urbano, Audretsch, Aparicio & Noguera, 2020: 1065-1099).

Furthermore, earlier research by Lindgren and Packendorff (2003:90, 2011:51-52) suggests that projects may be considered a metaphor for entrepreneurial action. In their original study, a theory of the temporary organisation, Lundin and Söderholm (1995:437) argue that traditional theories of the firm are based upon the belief that decision-making is at the organisation’s centre. However, decision-making is not equal to action. Being an entrepreneur is entirely different from doing what it takes to make it happen. The action orientation of the temporary organisation implies transformation, meaning that change must be achieved before the temporary organisation can terminate (Jacobsson, Burström & Wilson, 2013:577).

Transition refers to the work or the desired outcome, a distinguishable before-and-after result (Hanisch & Wald, 2014:198). Project-related tasks or the *raison d’être* for innovation are signals for action. Transition can include changes of various magnitudes, ranging from fine-tuning, incremental adjustments and modular transformation to a total and complete turnaround (Jacobsson, Lundin & Söderholm, 2015:14). The required action and time allocation for each task will vary depending on the desired transformation. When studying organisations as a temporary phenomenon, attention is inevitably drawn to a different aspect, such as time. (Lundin & Steinthórsson, 2003:248; Poblete, Kadefors, Rådberg & Gluch, 2022:301).

Very little research focuses on time and the effects it has on the organisation (Ancona, Goodman, Lawrence & Tushman, 2001:645; Dawson, 2014:287; McMullen *et al.*, 2021:4; Tyssen, Wald & Spieth, 2013:54). It is pertinent to note that time is not explicitly linked to the temporary organisation but to its actions (Ika, 2011:437-455). Time in a temporary organisation is finite from the onset and managing it is complex (Sydow & Braun, 2018:5). While a temporary organisation benefits from intentionally limited periods, the actual duration of temporary organisational activities may not only differ between short and long-term arrangements but may also vary significantly from ex-ante agreements (Bakker, DeFillippi, Schwab & Sydow, 2016:1704). Furthermore, 'temporary' does not equate to 'shorter', as construction projects can last several years (Schüßler, 2017:1).

Moreover, several megaprojects outlive their parent organisations, and more often than not, contemporary organisations are not infinite. The main difference lies in temporary organisations' ex-ante-defined and predetermined duration (Bakker *et al.*, 2016:1704). Throughout its development as a business discipline, entrepreneurship has borrowed, built on and adapted theories and concepts from other disciplines (Kuratko, Morris & Schindehutte, 2015:1). Lindgren and Packendorff (2003:86) propose a "project-based view of entrepreneurship", which is action-oriented. They argue that the entrepreneur or organisation's actions are temporary (time-dependent); therefore, they can be analysed in the context of projects. Furthermore, when postulating that entrepreneurial actions are "temporary projects", it means, by implication, that several entrepreneurial actions can be initiated in various ways and with different results. Lundin and Söderholm (1995:445) call it "action-based entrepreneurialism".

In conclusion, based on the information presented in the preceding discussion, it can be accepted that there is an inherent similarity between project practice and entrepreneurial action (Di Muro & Turner, 2018:968). This study has combined two segregated research fields, entrepreneurship and project management (Kuura *et al.*, 2014:214-215), providing a coherent view of how project management has evolved from a practical discipline towards an organisationally strategic one. Entrepreneurship research perspectives have evolved beyond those offered by some earlier studies (Shane, 2012:10; Shane & Venkataraman, 2000:217).

1.5.2 Contingency theory

The initial questions posed in this study were: What is the nature of the relationship between project success and EP, and is the relationship influenced (moderated) by project risk? The unit of analysis was the relationship between project success and EP. Consequently, in line with the nature of the research question, this study has taken a contingency theory perspective (Joslin & Müller, 2015:1378).

Additionally, this research has elaborated on the theory of the temporary organisation (Lundin & Söderholm, 1995) by linking it to contingency theory (Shenhar, 2001:395), which relates in particular to the context of a project (Fernandes, Spring & Tarafdar, 2018:1341). As Donaldson (2001) postulates, this study subscribes to and incorporates contingency theory. In organisations, contingency theory explains the impact of independent variables on dependent variables as a function of a third or context variable (Joslin & Müller, 2015:1382). Furthermore, for this research, contingencies relate to the internal organisational environment. This is firm-specific and may include variables such as efficiency, customer satisfaction, business growth, decision-making, product innovation and behavioural dimensions. This perspective is in line with contingency theory. This means that how conducive an organisation is to innovation depends on and is influenced by internal and external factors (Drechsler & Natter, 2012:438). In terms of competitiveness, firms must not only align internal strategies based on organisational factors but also match their strategies to the environment in which they operate (Popa, Soto-Acosta & Martinez-Conesa, 2017:135).

In his work, Shenhar (2001:394) maintains that project managers and scholars generally assume that all projects are fundamentally similar and adopt a one-size-fits-all approach. His exploratory research “shows how different types of projects are managed in different ways, and ... explore[s] the domain of traditional contingency theory in the more modern world of projects”. Furthermore, Haveman and Wetts (2019:8) and McAdam, Miller and McSorley (2019:195) argue that by considering the interaction between a business and its environment, the concept of contingent theory assumes that the strategies and activities of organisations are dependent on the environmental conditions in which they function.

Consequently, contingency theory postulates that the business environment involves complex and uncertain factors and is influenced by various interdependent external and internal factors (Haveman & Wetts, 2019:8; Makgopa, 2019:60).

As viewed from a contingency perspective, innovation is generally complex and operates under uncertain conditions, which will require the organisation to orchestrate its knowledge (information input and output) and activities in such a way as to ensure success (Dvir, Sadeh & Malach-Pines, 2006:37; Pérez-Luño, Bojica & Golapakrishnan, 2019:95; Zhang, Qi, Wang, Pawar & Zhao, 2018:908).

Although environmental uncertainty can be a powerful moderator, there may also be other factors contributing to this relationship. For example, Torres (2014:19) identified risk as one of several moderating environmental factors that may impact organisation performance (Bahli, Sidenko & Borgman, 2011:3). Morris and Geraldi (2011:20) support the notion that projects will be considered on three levels in the future: technical, strategic and institutional. They further define the institutional level as “creating the context and support for projects to flourish and their management to prosper”. According to Biesenthal, Clegg, Mahalingam and Sankaran (2018:47), the institutional level is about creating a supportive and contingent environment for projects and their management to flourish.

This study used continuity theory as a theoretical framework to examine the impact of project success on EP when faced with project risk.

1.5.3 Resource-based theory

Some scholars differentiate between entrepreneurial organisations and other business forms based on the organisation’s ability to innovate, and its capacity for taking risks and proactive actions (Miller, 1983:770; Miller & Friesen, 1983:222). This has led other scholars to investigate the correlation between entrepreneurial orientation and performance (Gao *et al.*, 2018:178). However, entrepreneurial orientation contributes to entrepreneurial performance based on the organisation’s strategic ethos (Hitt, Xu & Carnes, 2016:77). Resource base theory has been a dominant paradigm in various academic fields, such as entrepreneurship and strategic management (Umrani *et al.*, 2018:60).

The premise of the theory postulates that organisations are heterogeneous depending on differences in their resources (Hitt *et al.*, 2016:77-78). However, the thinking of the time argued that heterogeneity is only temporary because similarities will develop over time (Hitt *et al.*, 2016:78). To consider organisations as homogeneous is in stark contrast to the general objective of the organisation, which is to differentiate itself from its achievements through sustained competitive advantage.

Therefore, scholars in the field of entrepreneurial and strategic management adopt and identify with resource-based theory because it contributes to how organisations generate competitive advantage through their strategies and indicates versatility in terms of the range of services that resources can provide to entrepreneurial managers (Nason & Wiklund, 2018:34). Moreover, resource base theory suggests that organisations fostering value-creating strategies, such as innovation projects, have a higher degree of competitive advantage and performance than their competition (Hitt *et al.*, 2016:78).

This study sought to provide new insights into alternative characteristics of resources derived from a similar conception of the firm to enhance the performance construct and illuminate new avenues of growth for firms (Nason & Wiklund, 2018:32).

1.6 RESEARCH OBJECTIVE

For organisations to be relevant and successful, innovative change through entrepreneurial action should form part of their ethos to survive the turbulent economic environment in which the organisation operates. Projects drive business innovation and implement strategic changes to achieve a competitive advantage; moreover, projects set goal-directed action into forceful motion. However, contemporary literature has yet to definitively study the relationship between entrepreneurship and project practice. Therefore, the research objective was to investigate the relationship between project success and EP within project-oriented organisations. Furthermore, by incorporating the moderating effect of project risk on the relationship between project success and EP, the study contributes to research in various academic and practice fields.

These and other objectives were achieved by developing a structural equation model. Through the SEM model, the researcher predicted the relationship between the organisation's level of project success and the entrepreneurial nature of such an organisation. Consequently, answering the proposed research questions was the key to attaining these objectives.

1.7 RESEARCH QUESTIONS

1.7.1 Primary research questions

- Is there a significant positive relationship between project success and EP?
- To what extent does project risk moderate this relationship within South African project-oriented organisations?

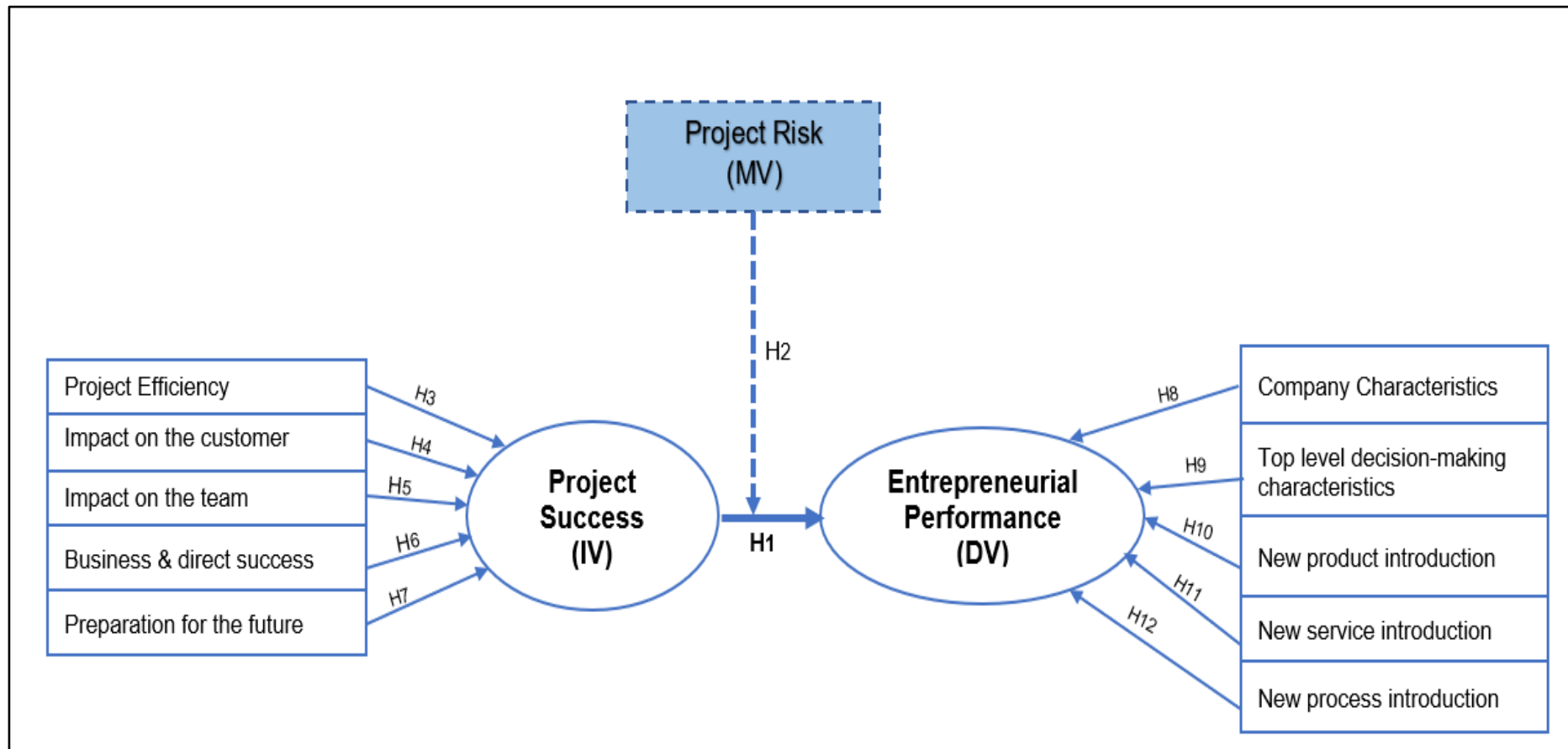
1.7.2 Secondary research questions

- Is there a significant positive relationship between project success and EP?
- Does project risk moderate the relationship between project success and EP?
- How does project efficiency, impact on the customer, impact on the team, business and direct success and preparation for the future influence project success?
- How do company characteristics, top-level decision-making characteristics, new product introduction, new service introduction and new process introduction influence EP?

1.8 HYPOTHESES DEVELOPMENT

To achieve the research objectives and answer the research questions posed, the researcher developed a conceptual model to test the relationships, as shown in the hypothesised model presented in Figure 3 (p. 19). The model indicates that Hypothesis 1 assumes a positive relationship between project success and EP. Further, Hypothesis 2 suggests that project risk moderates the relationship between project success and EP.

Figure 3: Hypotheses model



Source: Author's compilation.

It is important to note that the hypothesised model shown in Figure 3 (p. 19) represents the hypothesised relationships between the constructs (latent and formative variables) as derived from the literature. The formative measurements are derived from the assumption that these variables cause or bring about the construct. Furthermore, these formative indicators define the construct, implying that omitting any of the formative variables can alter the nature of the construct (Park, Lee & Chae, 2017:93).

1.8.1 Hypotheses

Based on the questions in the preceding section, the study hypotheses were as follows:

- H1: Project success and EP have a significant positive relationship as depicted in Figure 3 (p. 19).
- H2: Project risk moderates the relationship between project success and entrepreneurial performance as depicted in Figure 3 (p. 19).
- H3-H7: There is a positive relationship between project efficiency, impact on the customer, impact on the team, business and direct success, and preparation for the future and project success as depicted in Figure 3 (p. 19).
- H8-H12: There is a positive relationship between company characteristics, top-level decision-making characteristics, new product introduction, new service introduction, and new process introduction influence entrepreneurial performance as depicted in Figure 3 (p. 19).

The hypotheses of this study are listed and linked to the research questions in Table 1.

Table 1: Summary of research questions and hypotheses for the quantitative phase

Research questions	Hypotheses
Is there a significant positive relationship between project success and entrepreneurial performance?	(H1) There is a significant positive relationship between project success and entrepreneurial performance.
To what extent does project risk moderate (<u>moderating variable</u>) the relationship between project success and entrepreneurial performance?	(H2) Project risk has a moderating effect on the relationship between project success and entrepreneurial performance.

Research questions	Hypotheses
<p>How does project efficiency, impact on the customer, impact on the team, business and direct success and preparation for the future influence project success (<u>independent variable</u>)?</p>	<p>(H3) There is a positive relationship between project efficiency and project success.</p> <p>(H4) There is a positive relationship between impact on the customer and project success.</p> <p>(H5) There is a positive relationship between impact on the team and project success.</p> <p>(H6) There is a positive relationship between business and direct success and project success.</p> <p>(H7) There is a positive relationship between preparation for the future and project success.</p>
<p>How do company characteristics, top-level decision-making characteristics, new product introduction, new service introduction and new process introduction influence entrepreneurial performance (<u>dependent variable</u>)?</p>	<p>(H8) There is a positive relationship between company characteristics and entrepreneurial performance.</p> <p>(H9) There is a positive relationship between top-level decision-making characteristics and entrepreneurial performance.</p> <p>(H10) There is a positive relationship between new product introduction and entrepreneurial performance.</p> <p>(H11) There is a positive relationship between new service introduction and entrepreneurial performance.</p> <p>(H12) There is a positive relationship between new process introduction influence and entrepreneurial performance.</p>

Source: Author's compilation.

1.9 RESEARCH DESIGN AND METHODOLOGY

Research methods are associated with different kinds of research design. The research design guides the execution of a research method and the analysis of the subsequent data (Bell *et al.*, 2019:45). This was a quantitative study consisting of a literature study and an empirical study to answer the research questions and test the hypotheses (Bell *et al.*, 2019:161).

1.9.1 Literature study

The initial section relating to the literature review is descriptive. It incorporates secondary sources providing a context for the existing body of knowledge on project success and its perceived merits as a catalyst for entrepreneurial success.

Furthermore, the literature review informs and provides theoretical support for developing the hypothesis relationship between project success and EP. It also highlights the moderating effect of project risk on project success and EP. Incorporating a literature review further provided a theoretical foundation for comparing and contrasting project risk, project success and EP.

1.9.2 Empirical study

From a positivist perspective, the empirical part of this study examined the research problem. At the same time, the quantitative analysis of data obtained provided inductive conclusions regarding these hypotheses (Oosthuizen, 2018:23). The study used a cross-sectional, ex post facto design. The purpose of this part of the study was to:

- determine the most influential criteria for project success,
- identify the criteria that have the most significant impact on EP, and
- provide statistical evidence in support of the postulated measurement and structural model for predicting the perception of project success benefits (Oosthuizen, 2018:23).

1.10 SAMPLING AND DATA COLLECTION

A convenient sampling technique was used to collect primary data, after which the data of 369 project-oriented organisations were used for the empirical analysis, which is elaborated on in Chapter 5.

1.10.1 Research instrument

Survey data were collected using a self-administered questionnaire. For this study, the Entrepreneurial Performance Index questionnaire (Morris & Kuratko, 2002:292–294) and

the project success questionnaire (Shenhar & Dvir, 2007:219–220) were tailored to analyse the relationship between project success and EP. In addition, they were also tailored to establish what, if any, moderating effect project risk has on the dependent and independent variables. The study research questionnaire is attached as Appendix B.

1.10.2 Analysis of data

The empirical part of this study used different inferential statistical techniques, including SEM, to achieve the study's objectives. Detailed discussions of the research design and methods applied in this study are provided in Chapter 5.

1.11 CONTRIBUTION OF THE STUDY

1.11.1 Theoretical contribution

This study aimed to engage in interdisciplinary research. Geraldi, Söderlund and van Marrewijk (2020:351) refer to interdisciplinary research as the “cross fertilisation” of academic disciplines, arguing that interdisciplinary research can increase the diversity of disciplines, resulting in potential new areas for theorisation. This study has defined interdisciplinary research as: “Different academic disciplines working together to integrate disciplinary knowledge and mentors, to develop and meet the shared research goals achieving a real synthesis and approaches” (Kelly, Mackay, Nash, Cvitanovic, Allison, Armitage, Bonn, Cooke, Frusher, Fulton & Halpern, 2019:150).

The main reason for engaging in interdisciplinary research is linked to the inherent complexity of the investigated phenomena. Despite the vast body of literature on entrepreneurship and project management, the literature and practice show a clear fragmentation and segregation of the two disciplines. The idea is not to reinvent new dependent or independent variables but rather to understand the phenomena being investigated through a combination of theories, concepts, data and methods from several disciplines, identifying their scope, limitations and potential benefit (Cheng, Henisz, Roth & Swaminathan, 2009:1071).

The study's distinctive theoretical contribution lies in developing a hypotheses model that illustrates the relationship between project success and entrepreneurial performance. This

approach provides a new perspective on the relationship between two research fields by emphasising project success as the driver for entrepreneurial performance, whereas previous studies approached it from an entrepreneurial perspective (Davies, Manning & Söderlund, 2018:965; Kuura *et al.*, 2014:214; Lindgren & Packendorff, 2003:87; Martens *et al.*, 2018:256; Martes, Carneiro, Martens & Silva, 2015:29). From which, this study provides a new dynamic perspective on project risk's moderating role in the relationship between project success and entrepreneurial performance.

1.11.2 Managerial contribution

The study findings can provide valuable insight for top management in terms of value it could add to their project practices. This is done by looking at the application of projects not only from a tools-and-technique perspective but as a credible business strategy that can contribute significantly to the organisation's overall performance. It is, therefore, argued that this study contributes to the theoretical and empirical knowledge of project success and EP.

1.12 DELIMITATIONS AND ASSUMPTIONS OF THE STUDY

Delimitation describes the parameters for this research as based on the following limitations:

- Project success was evaluated only from the functional aspect of the manager's role or contribution.
- The purpose/objective of the organisation's projects and entrepreneurship was investigated, not the practitioners' characteristics or nature.
- An analysis was undertaken of academic literature from Google Scholar, Ebsco-host, ProQuest and databases, primarily using titles published since 1985.
- The data used in the quantitative phases of the research on which this study is based were obtained from project-oriented organisations. Therefore, the results must be read and understood with this in mind.
- The study investigated only those aspects relating to project success, EP, and project risk and its related variables.

1.13 ETHICAL CONSIDERATIONS

The very essence of academia is conducting research that will be published because research ultimately contributes to knowledge by building and expanding on what is already known. However, knowledge can only add value if it is shared through publication in journals, articles, theses, dissertations or books. Therefore, it is the responsibility of researchers to conduct their work morally based on ethical principles. Ethics refers to the “ethos” or “way of life” distinguishing acceptable and unacceptable actions (Akaranga & Makau, 2016:1).

- Copyright: To the best of the researcher's ability, all information obtained for this research is free from copyright infringements.
- Plagiarism: The researcher ensured that due credit was given to all authors consulted in the research.
- Voluntary participation: The researcher ensured that all participants knew that participation was voluntary and that they could withdraw from the research at any stage.
- Non-financial incentives: Participation in the research was not based on financial gain.
- Physical or psychological harm: To the best of their ability, the researcher ensured that no physical or psychological harm came to any participant in this study.
- Informed consent: Participants were provided with a consent form that formed part of the questionnaire.
- Confidentiality and anonymity: The researcher adhered to and respected participants' requests to keep their identities confidential, where so indicated.
- Deception: The researcher was transparent and honest with participants in all aspects of the proposed study.
- Privacy and security: Email addresses used in distributing questionnaires have not been used for any other purpose or shared with any third party.
- Archiving and data storage: Data obtained from this study will be stored securely online for five years.

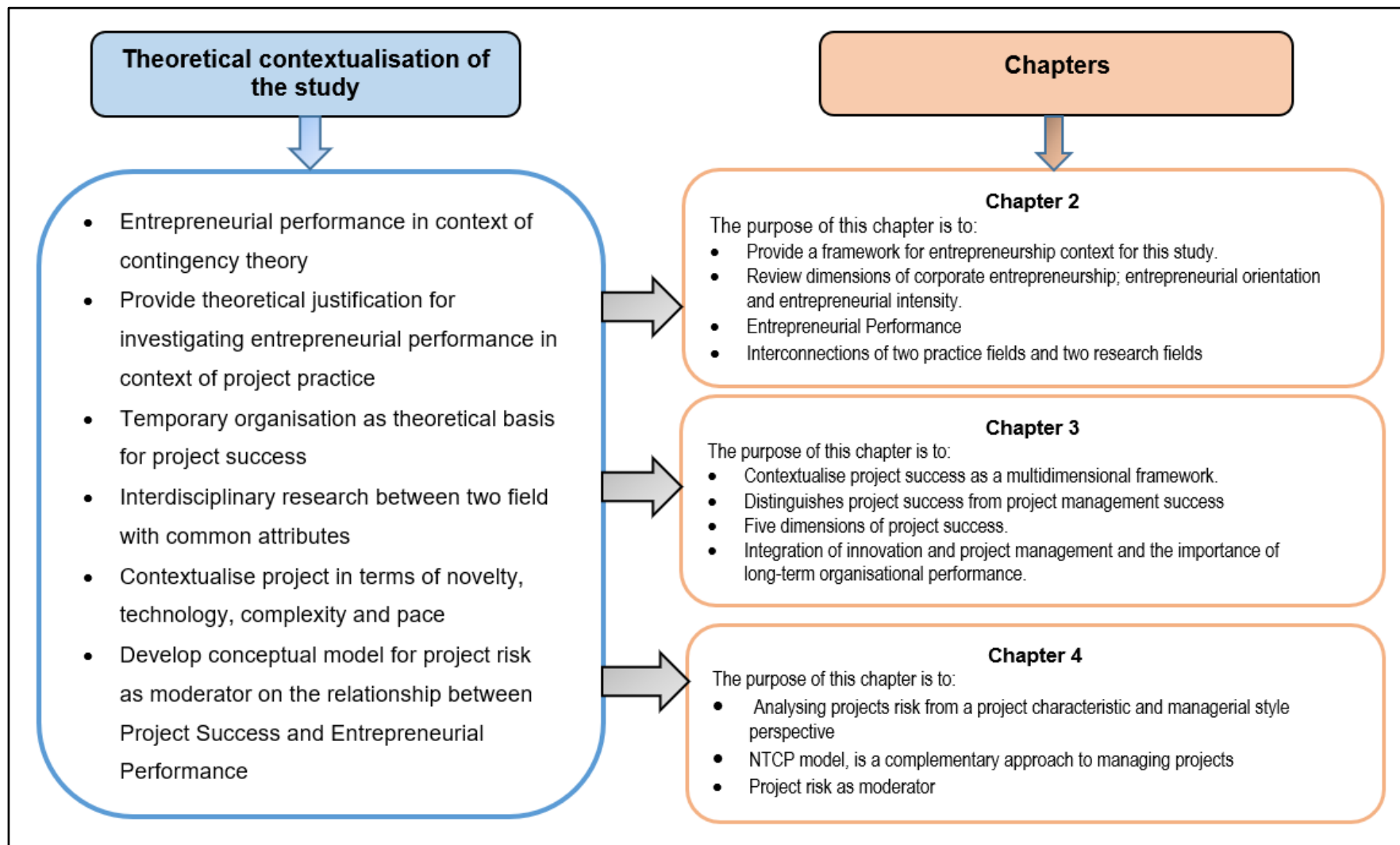
The questionnaire used in this study was submitted to the University of Pretoria's Research Ethics Committee, with approval awarded on 19 October 2020. Several organisations

granted permission to distribute the questionnaires through their members. These permission letters are attached as Appendix C.

1.14 SCHEMATIC THESIS LAYOUT

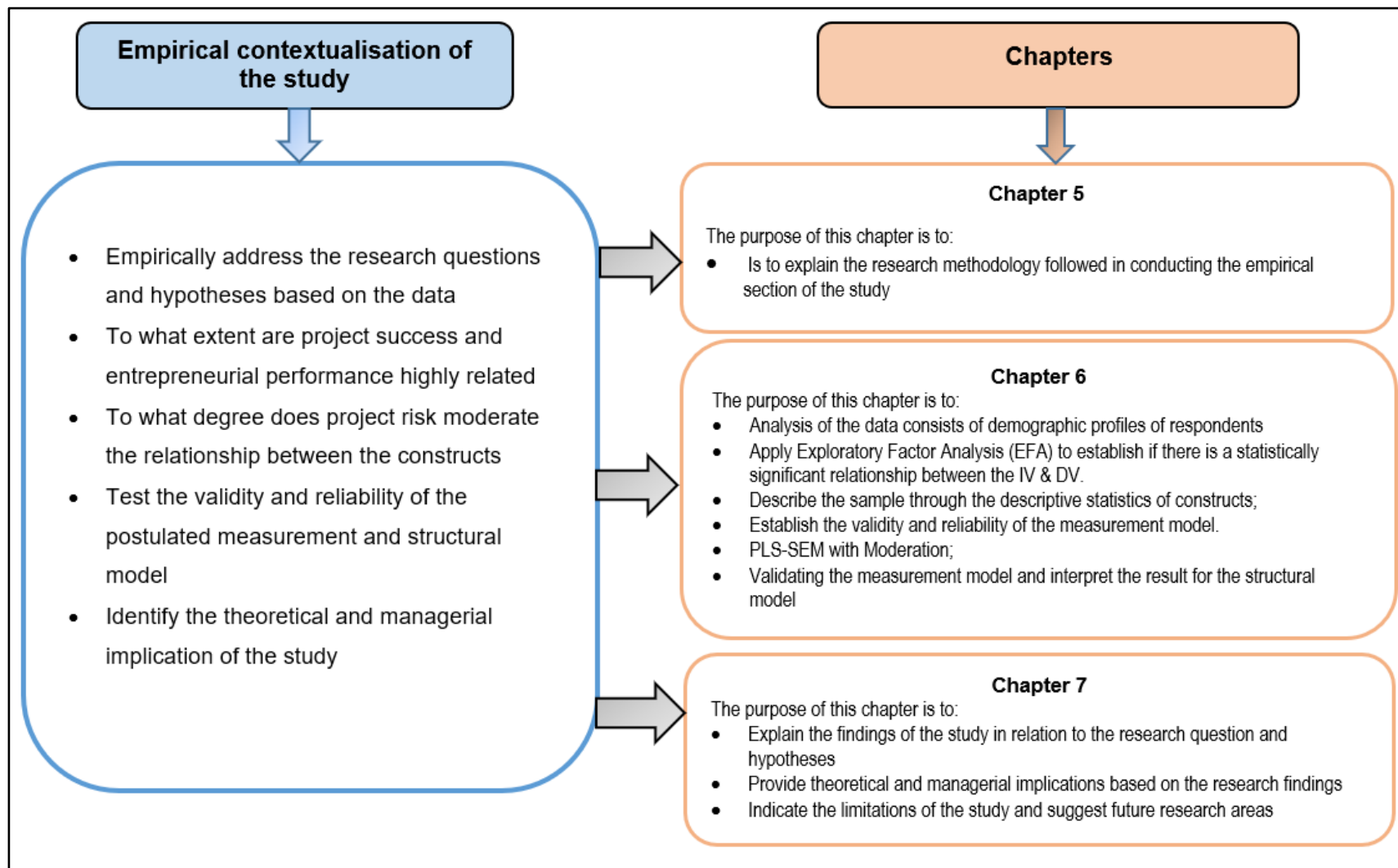
Figure 4 (p. 27) and Figure 5 (p. 28) provide a schematic synopsis of the theoretical and empirical sections of the study, briefly indicating the purpose and objectives addressed in each chapter.

Figure 4: A schematic representation of the study's theoretical context



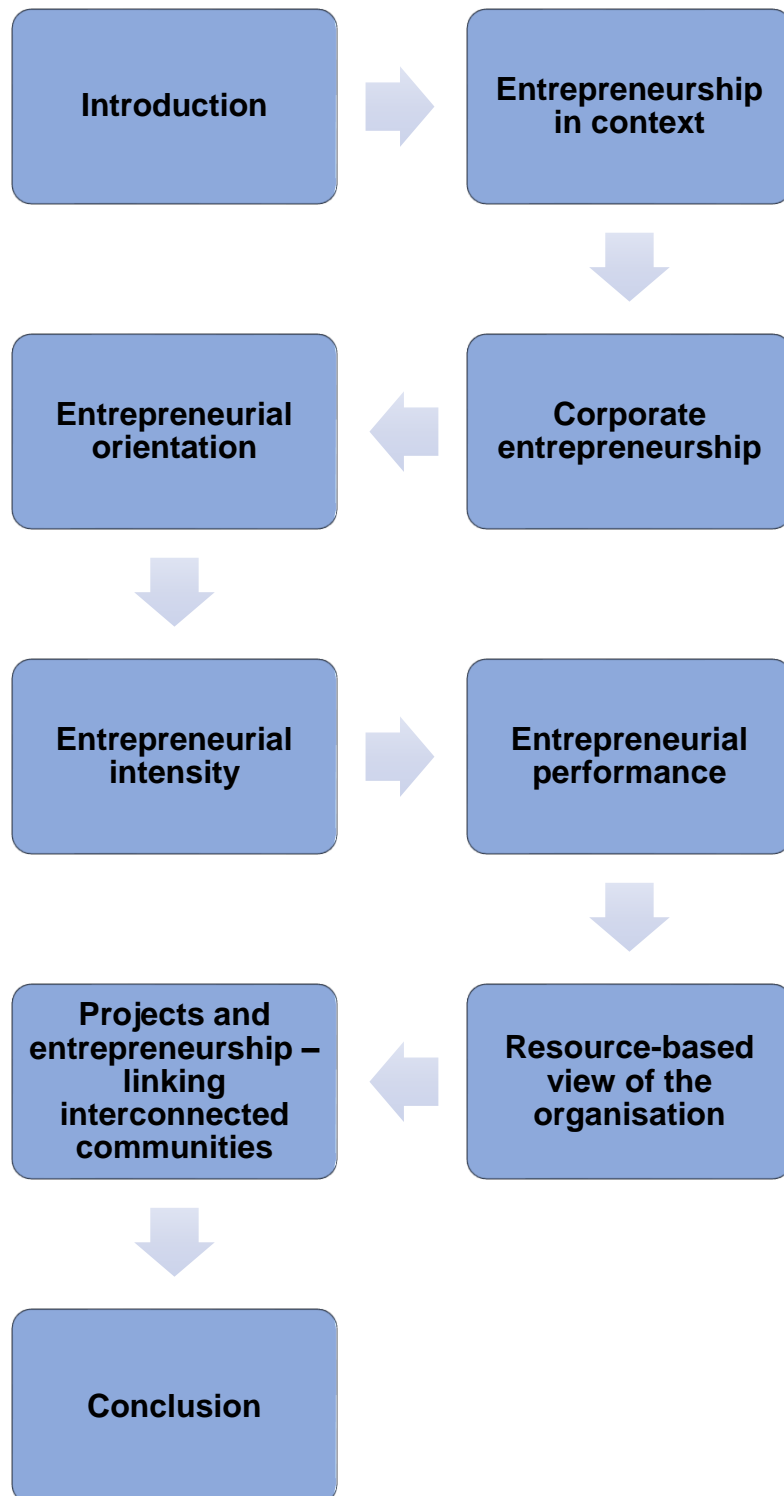
Source: Author's compilation

Figure 5: A schematic representation of the study's empirical context



Source: Author's compilation

CHAPTER 2 ENTREPRENEURIAL PERFORMANCE



2.1 INTRODUCTION

This chapter presents a review of various dimensions in the field of entrepreneurship. The purpose of this review is to provide a framework for what entrepreneurship entails in the context of this study. Aspects addressed include entrepreneurship in context, corporate entrepreneurship, EO, entrepreneurial intensity and resource-based theory to interpret the dependent variable (EP). Finally, this section elaborates on the research and practical link between projects and entrepreneurship.

Fundamentally, entrepreneurship is an economic function performed by the individual(s) acting entrepreneurially, independently or within organisations. The objective is to identify new opportunities, despite uncertainty, and introduce new products or services in the market by making decisions about location, product design, resource use, institutions and reward systems (Carlsson *et al.*, 2013:914). Entrepreneurship has infiltrated almost every aspect of society despite the differences and contradictions over what it is and is not. The ‘problem’ with entrepreneurship research, some scholars say, lies in the lack of a standard definition and boundaries (Groenewald, 2010:32; Shane & Venkataraman, 2000:218). This may be because entrepreneurship has many facets and is studied from different viewpoints, resulting in many definitions (Agunwah, 2019:17).

The definition by Kuratko and Hodgetts (2007) best captures the essence of entrepreneurship in the context of this study: “Entrepreneurship is a process of innovation and new venture creation through four major dimensions – individual, organisational, environmental, process – that is aided by collaborative networks in government, education, and institutions.” All macro and micro positions of entrepreneurial thought must be considered while recognising and seizing opportunities that can be converted into marketable ideas capable of competing for implementation in today’s economy (Groenewald, 2010:35).

From this definition, one can conclude that entrepreneurship is a process, meaning it is the management of activities applicable within any organisational context. Furthermore, entrepreneurship adds value by uniquely and creatively using often-scarce resources. Thus, entrepreneurship is an opportunity-driven behaviour from which to profit. Entrepreneurship is far more than simply establishing a business; while it is undoubtedly a vital component, it

is not the complete picture. What permeates entrepreneurship is the aptitude to recognise opportunities and take calculated risks, and the tenacity to transform ideas into profitable reality (Kuratko, 2011:9).

As for so many businesses worldwide, South African organisations are still reeling from the severe negative impact of COVID-19 on their economy, which has put even more strain on already high levels of unemployment in South Africa. The significance of this, therefore, is that it requires organisations to identify factors that could ensure the survival and growth of their businesses, which is particularly important for sustainable economic development (Van Wyk & Adonis 2011:3047). Furthermore, some scholars argue that in an environment of fierce competition and uncertainty, entrepreneurship is the key to business success, which Briggs (2009:786) considers a necessity for economic growth, resulting in sustainable development (Drucker, 1995:1; Johnson & Schaltegger, 2020:1141; Kuratko & Morris, 2018:43). Therefore, entrepreneurship is fundamental to creating jobs and developing and achieving economic autonomy (Awogbenle & Iwuamadi, 2010:831).

On a different but related point, notwithstanding the benefits that entrepreneurship affords economic growth, some scholars highlight a concern about the type of entrepreneurship that countries ought to adopt and endorse (Valliere & Peterson, 2009:460; Van Vuuren & Alemayehu, 2018:2). For that reason, an organisation must understand what it means to be entrepreneurial. Even though it might be tempting to conceptualise entrepreneurship as an either/or activity, it is worthwhile to understand that entrepreneurship varies in its application. This suggests that every organisation is more or less prone to entrepreneurship. Therefore, it is not a question of whether an organisation is entrepreneurial but to what extent it is (Morris, 2015:1).

Some consider entrepreneurship to be a multifaceted concept encompassing different activities and behaviours; as it mutates in response to changes in the market, like a chameleon, entrepreneurship can adapt to reflect its environment (Kapepa, 2017:39). The problem is that organisations are not always equipped or do not always have the necessary know-how to initiate innovative activities among their people (Kuratko, Hornsby & Covin, 2014:37-38). Managing an innovative environment involves dealing with paradoxes, and it is evident that the contemporary environment is filled with contradictions.

McNulty (2017:1) argues that organisations should replace 'or' with 'and' to deal with these paradoxes and contradictions. The common conjunction 'and' can now reconcile and explain extremely paradoxical and seemingly tricky issues such as complex challenges, dynamic markets and fast-changing technologies. For example, innovation and lower risks are critical elements of a firm's performance. Kuratko and Morris (2018:43) argue that promoting and fostering entrepreneurship is one way to overcome such paradoxes.

2.2 ENTREPRENEURSHIP IN CONTEXT

Historically, entrepreneurship research has had a strong presence in scholarly discourse. Hébert and Link's (1989) paper identified three distinct intellectual traditions that helped the development of the literature on entrepreneurship: the German tradition, grounded on von Thünen and Schumpeter; the Chicago tradition, based on Knight and Schultz; and the Austrian tradition, based on von Mises, Kirzner and Shackle (Audretsch, 2012:755). The literature on entrepreneurship, however, was sporadic 30 years ago, partly because the research community showed little interest in entrepreneurship in any form or context. However, entrepreneurship has become one of the most vital, dynamic and practical fields in the social and management sciences since the post-industrial age (Wiklund, Davidsson, Audretsch & Karlsson, 2011:1). Despite intuitively understanding and theoretically arguing that context is vital to interpret entrepreneurship Thomassen, Middleton, Ramsgaard, Neergaard and Warren (2019:863) argue that there is little agreement about what context is, as entrepreneurship is conceived from many different dimensions and can exist at several.

Moreover, entrepreneurship research has evolved beyond being a theory-driven approach. Instead, contemporary entrepreneurship focuses on fundamental themes, issues, practices and debates and has become an increasingly sophisticated field with many approaches developed through various methods and intellectual principles. In the process, many different methodologies have been developed, and, even more importantly, a broader understanding of what constitutes entrepreneurship has developed (Audretsch, 2012: 756). The following section elaborates on the context of entrepreneurship by distinguishing three perspectives.

2.2.1 Entrepreneurship in the context of the organisation

Based on the research literature, entrepreneurship is viewed as an organisational phenomenon. Aldrich and Martinez (2010:387) state that to understand the emergence of these new organisations, efforts typically focus on the role of entrepreneurs by emphasising the organisation. By definition, the organisational context makes it possible to be viewed or classified as entrepreneurial (Audretsch, 2017:5). Moreover, in this context, the type of behaviour or performance is irrelevant when considering whether the organisation is entrepreneurial. The organisational context is the only benchmark to be considered (Audretsch, 2012:756).

Various organisational indicators have been used to define entrepreneurship, such as organisational size, age, ownership (self-employed, nascent or family-owned) and legal status. It is not suggested that these measures represent all possible criteria; moreover, in some instances, apparent paradoxes exist. Thus, the organisation's status is the fundamental criterion determining whether a firm is considered entrepreneurial (Audretsch, 2012:756).

2.2.2 Entrepreneurship based on performance criteria

An entirely different perspective on entrepreneurship is based on performance criteria. Focusing on performance rather than on the process enables the organisation or person who produces high levels of performance to be categorised as entrepreneurial (Audretsch, 2012:761). In general, the literature has identified two types of performance: innovation and growth (Audretsch, 2017:6). In Schumpeter's 1934 view, entrepreneurs drive economic progress, growth and development through innovation. Entrepreneurs are distinguished from other economic agents by their willingness to pursue innovative activities (Garud, Gehman & Giuliani, 2014:1180; Wasdani & Mathew, 2014:338). Thus, to highlight the importance of innovation in general, Schumpeter also stresses the role that such activity plays in competitiveness and growth (Estrin, Korosteleva & Mickiewicz, 2022:269). From this interpretation, the different types of organisational criteria are deemed immaterial because innovative activities can be performed in any organisation. Therefore, in this context, innovation is the only relevant criterion for performance.

In this respect, linking entrepreneurship to innovation, regardless of the organisational context, emphasises performance concerning innovative activities (Audretsch, 2012:761; 2017:6).

Another performance criterion for entrepreneurship performance is growth, often used as a proxy for innovation, as innovation is notoriously difficult to measure (Audretsch, 2012:760). Many problems, including challenges, risks and concerns, can be attributed to innovation activities, especially concerning processes and organisational innovations. In relation to innovation, growth is typically measured via changes in employment and sales over time, so it is much easier to interpret. In a slightly different way, a measure of entrepreneurship performance would be based on the firm's source of funding, particularly venture capital. Although this criterion is explicitly based on the source of finance, it could be interpreted as an expectation of performance (Audretsch, 2012:760; 2017:6). Because context matters, organisational performance is often evaluated in terms of innovation and growth (Audretsch, 2017:6). Therefore, substantial empirical evidence identifies innovation and growth as EP criteria (Audretsch, 2012:759; 2017:6; Garud *et al.*, 2014:1179).

2.2.3 Entrepreneurship in the context of behaviour

In general, entrepreneurial behaviour is associated with Schumpeterian notions of entrepreneurship; that is, two fundamental components can characterise entrepreneurial behaviour: opportunity recognition and the ability to exploit or commercialise the opportunity (Alvarez, Barney & Young, 2010:23; Audretsch, 2012:761; Kuckertz *et al.*, 2017:78). Identifying opportunities is neither a rigid nor a linear process; it is a multidimensional iterative process, which involves interactions between behaviour, cognition and the environment (Wasdani & Mathew, 2014:338). That is to say, entrepreneurial action can only be materialised if, and only if, the organisation decides to pursue innovative opportunities. However, the ability of organisations to identify opportunities differs significantly, which relates directly to their behaviour orientation (Wasdani & Mathew, 2014:338).

An important aspect of behavioural entrepreneurship is its neutrality concerning the organisational context. Entrepreneurial behaviour is present in all types of organisations regardless of size or whether they are non-profit or government agencies (Audretsch, 2012:761).

Krueger and Day (2010:322) state that “the heart of entrepreneurship is an orientation toward seeing opportunities”. Thus, entrepreneurship requires awareness of an opportunity and the intention to pursue it (Audretsch, 2012:761). According to Patriotta and Siegel (2019:1195), entrepreneurial behaviour and its opportunities are shaped by the interactions between different entities and social actors. Thus, entrepreneurial behaviour is not determined by its organisational context, nor is it enabled or constrained by it (Patriotta & Siegel, 2019:1195). Thus, creative, passionate and tenacious individuals generate entrepreneurial activity.

Therefore, the organisation's future is rooted in the spirit of entrepreneurship that lives within individuals. Thus, any advancement in an organisation will always be based on energy and passion. In order for individuals to innovate, corporate entrepreneurship is considered the single best strategy (Kuratko & Morris, 2018:43). Corporate entrepreneurship allows individuals within the organisation to take advantage of opportunities and innovate, regardless of the availability of resources (Ireland, Kuratko & Morris, 2006a:10). Moreover, corporate entrepreneurship is taking on a critical role in the success and development of organisations and becoming more than just a business strategy (Umrani *et al.*, 2018:60).

2.3 CORPORATE ENTREPRENEURSHIP

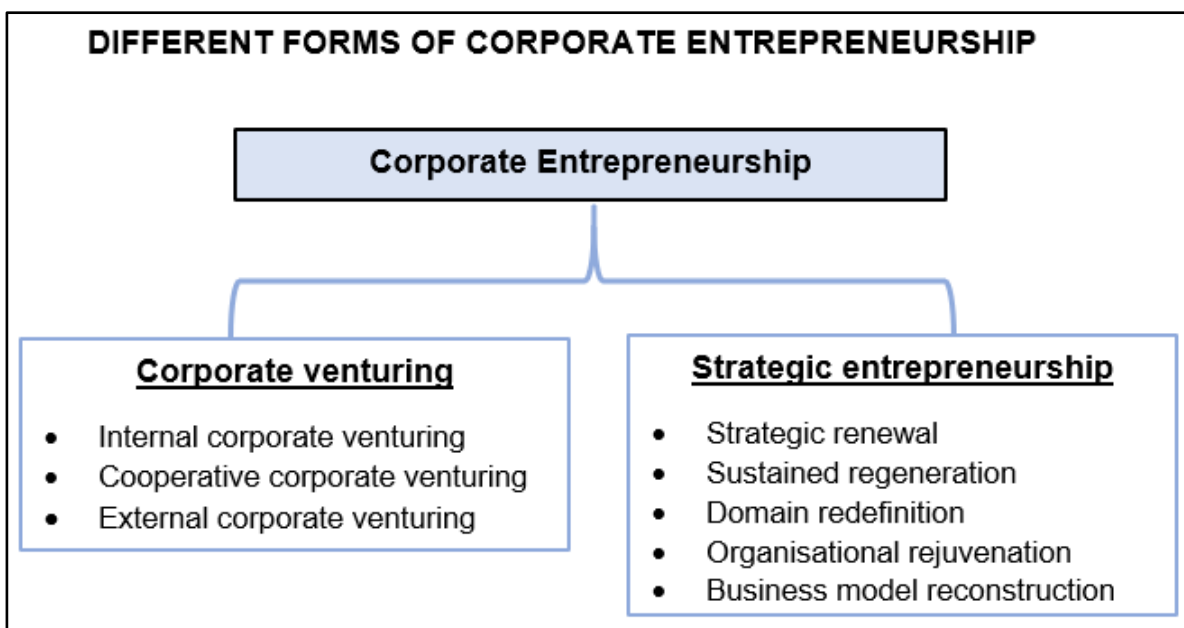
“Corporate entrepreneurship strategy is a vision-directed, organisation-wide reliance on entrepreneurial behaviour that purposefully and continuously rejuvenates the organisation and shapes the scope of its operations through the recognition and exploitation of entrepreneurial opportunity.”

Based on Ireland, Covin and Kuratko’s (2009:21) above definition of corporate entrepreneurship strategy, corporate entrepreneurship in its simplest form is a strategy of reinventing and developing an established firm through innovative activities (new products, processes and services) and competitive positioning as an opportunity to boost organisational performance, business renewal and competitiveness (Kuratko & Morris, 2018:43; Morris, Van Vuuren, Cornwall & Scheepers, 2009:429). However, for employees and managers to leverage their creative performance will fundamentally rely on the organisation's ability to present an environment conducive to tapping into this underutilised entrepreneurial talent (Elia & Margherita, 2018:271).

Moreover, corporate entrepreneurship is becoming an essential strategy in organisations of all types, regardless of how they decide to engage in it (Ireland *et al.*, 2009:29; Kuratko & Morris, 2018:43). In this sense, corporate entrepreneurship is increasingly acknowledged as a legitimate method to attain higher levels of EP (Kapepa & Van Vuuren, 2019:6).

Organisations engage in corporate entrepreneurship (a business as an entity in an organisation) for two reasons: creating new businesses within existing organisations and transforming existing corporations through strategic transformation (Kuratko & Audretsch, 2013:329; Kuratko & Morris, 2018:45). According to Morris, Kuratko and Covin (2008:81) corporate entrepreneurship can manifest in an organisation through corporate venturing or strategic entrepreneurship, as depicted in Figure 6.

Figure 6: The domains of corporate entrepreneurship



Source: Kuratko, Morris and Covin (2011:86).

Corporate venturing can be explained as follows. Based on internal corporate venturing, the new venture is created and owned by the corporation but may occasionally function as a semi-autonomous entity outside the corporate structure (Kuratko, Morris & Covin, 2011:86). For example, ventures may exist as part of an existing internal organisational structure, while others may be managed by newly formed organisational entities within the corporate structure (Kuratko & Audretsch, 2013:330). Cooperative corporate venturing refers to creating or operating new businesses with one or more external business partners.

As an external entity, cooperative ventures typically operate outside the organisational boundaries of their founding partners (Kuratko & Audretsch, 2013:330). The concept of external corporate venturing refers to new businesses established and led by parties outside the corporation, then acquired by the corporation or invested in via equity positions (Kuratko & Audretsch, 2013:33; Kuratko *et al.*, 2011:86; Morris *et al.*, 2008:81).

In the second domain, a strategic approach to entrepreneurship uses resources from both the strategic and entrepreneurial fields to create and act on business opportunities (Kuratko & Audretsch, 2013:329). Several scholars have identified five forms of strategic entrepreneurship (Ireland & Webb, 2007:51; Kuratko & Audretsch, 2013:329; Kuratko *et al.*, 2011:86; Morris *et al.*, 2008:81; Tseng & Tseng, 2019:111):

- strategic renewal (adoption of a new strategy),
- sustained regeneration (introduction of a new product or service in an existing category),
- domain redefinition (reconfiguration of an existing product or market category),
- organisational rejuvenation (internal focus on strategic innovation improvement), and
- business model reconstruction (redesign of existing business model).

Through innovative streams, strategic entrepreneurship provides a competitive advantage. However, it does not necessarily generate new business (Kuratko & Morris, 2018:45). Therefore, organisations ought to consider strategic entrepreneurship in terms of (Kuratko & Morris, 2018:45):

- the extent to which the organisation transformed itself relative to where it was before, for example, whether it has transformed its products, markets or internal processes, and
- how much transformation has occurred compared to industry protocols or standards in the context of the organisation's product offerings, market definitions and internal processes.

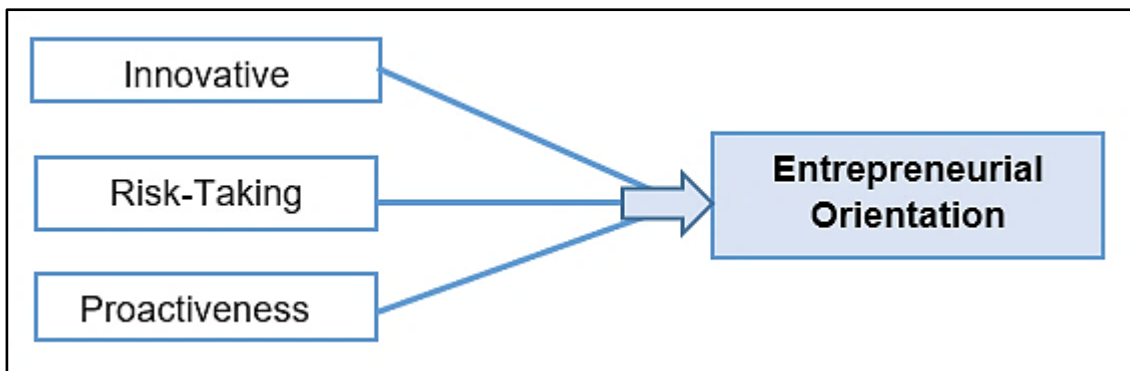
Corporate entrepreneurship takes a holistic view of the organisation – not of the role of individuals but of the innovative undertakings that take place within an organisation, such as new ventures within an existing organisation, process transformation and shifting positions in the status quo (Osiri, Macarty, Davis and Osiri, 2013:34).

Based on the information presented, it seemed reasonable to the researcher to assert that corporate entrepreneurship promotes organisational performance through innovation, risk-taking and proactive initiatives. Hence, this study supported the notion that corporate entrepreneurship is representative of innovation, risk-taking and proactiveness. Therefore, a logical question arose from these various activities and domains: How entrepreneurial is an organisation?

2.4 ENTREPRENEURIAL ORIENTATION

EO considers the history of a company's strategic behaviour, categorised as a sequence of trends. This means that the company could be more conservative or more entrepreneurial. Therefore, firms that exhibit more innovative, proactive and risk-taking activities are generally more entrepreneurial (Kuratko & Morris, 2018:46). Thus, understanding the organisation's EO helped the researcher to answer the question posed in the previous section, as illustrated in Figure 7.

Figure 7: EO model



Source: Chitrakar (2019:5).

At the entrepreneurial end of the spectrum, EO is characterised as innovative (introduction of new products, processes or business models), proactive (initiating the development of new products/markets by actively seeking leadership positions in those markets) and risk-taking (strategic division-makers are willing to contribute resources to projects with an uncertain outcome) (Kuratko & Morris, 2018:46). The focus is on strategy, that is, the organisation's business models, methods and practices that assist with decision-making to improve efficiency and effectiveness.

EO is based on how the organisation operates, not on what it does (Anderson, Kreiser, Kuratko, Hornsby & Eshima, 2015:1579; Boohene, 2018:2; Wiklund & Shepherd, 2005:74). Further, some scholars argue that innovation, risk-taking and proactive characteristics distinguish entrepreneurial firms from other traditional businesses (Hernández-Perlines, 2018:58; Miller, 1983:770; 2011:874).

In essence, EO encapsulates an organisation's behaviour which is fundamental for its relationship with performance (Hernández-Perlines, 2018:60). Wiklund and Shepherd (2005:74) and George and Marino (2011:992) further suggest that EO hinges on innovation, decision-making and aggressive competition that stimulates change within the organisation. Finally, Morris and Sexton (1996:7) distinguish the degree and frequency of entrepreneurship to highlight an organisation's entrepreneurial intensity.

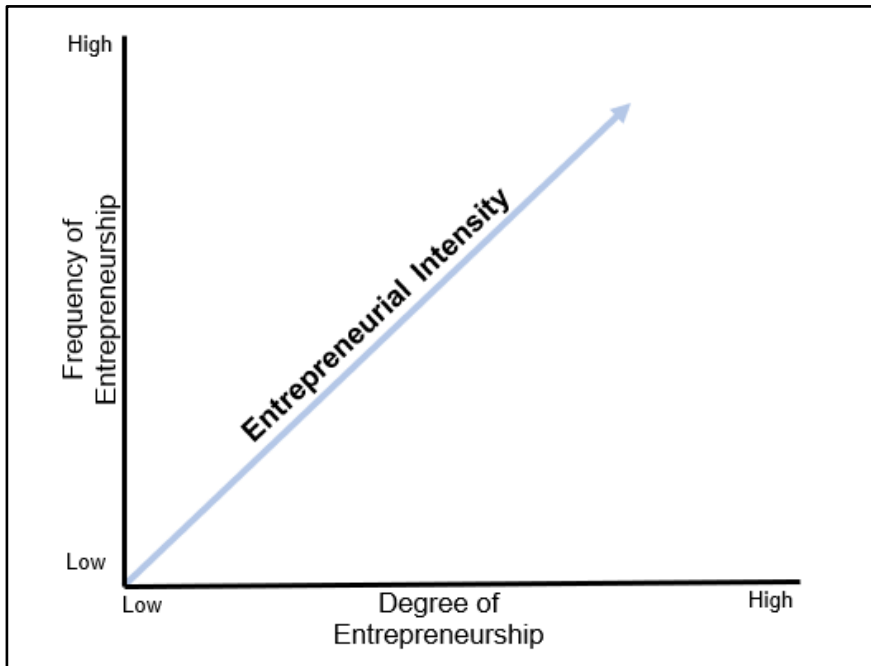
2.5 ENTREPRENEURIAL INTENSITY

Elaborating on the construct of EO, as presented in the previous section, Morris and Sexton (1996) were the first to introduce entrepreneurial intensity, which describes various levels of entrepreneurial activity, capturing both the degree and frequency of EO within an organisation. Intensity per se represents a concentrated phenomenon with a high level of effort, which Morris and Sexton (1996:6) link to entrepreneurial attitudes to measure the intensity of the first three EO dimensions: innovation, risk-taking and proactiveness (Benazzouz, 2019:27).

In the context of an organisation, the degree relates to the extent of innovation and risk-taking and how proactive the entrepreneurial activities are. In contrast, the frequency refers to the number of such (innovative, risky and proactive) entrepreneurial activities occurring in the organisation (Urban & Sefalafala, 2015:262). However, Morris and Sexton (1996:7) state that “no firm is entrepreneurial all the time, and no firm can ever be only entrepreneurial”. Consequently, entrepreneurship should not be viewed only as an either/or proposition but rather as a question of how often, to what degree and how frequently it should be practised. Moreover, the strategic and practical dimensions should be considered when evaluating entrepreneurship. Therefore, this study examined entrepreneurship from both a degree and frequency perspective.

Figure 8 (p. 40) illustrates how the dimensions of entrepreneurial activity (new product, service or process) relate to entrepreneurial intensity (Mazdeh, Razavi, Hesamamiri, Zahedi & Elahi, 2013:209). The vertical axis represents the frequency of entrepreneurial activities, while the horizontal axis relates to the entrepreneurial activities' degree (innovation, risk and proactiveness).

Figure 8: The variable nature of entrepreneurship



Source: Morris and Sexton (1996:7).

Several scholars (Ireland *et al.*, 2006a:11; Morris, 2015:2; Morris & Kuratko, 2002:291) argue that organisations have varying levels of entrepreneurial intensity, which addresses two fundamental questions:

- How many entrepreneurial projects is the organisation pursuing (frequency of entrepreneurship)?
- To what extent do these projects represent radical or disruptive innovations (degree of entrepreneurship)?

This implies that entrepreneurial intensity is a measure of the organisation's EP at any given time (Kuratko & Morris, 2018:48). Thus, for the organisation to better understand its level of entrepreneurship, the degree and frequency ought to be compared simultaneously. For instance, the organisation may pursue several entrepreneurial activities (high frequency);

however, these initiatives may not be innovative, risky or proactive (low degree). In contrast, the organisation may focus on breakthrough development projects (high degree) every two to three years (low frequency) (Ireland, Kuratko & Morris, 2006b:27; Morris, 2015:1; Kuratko & Audretsch, 2013:326).

2.5.1 The frequency of entrepreneurship

For some organisations, the objective is to continuously introduce a succession of (new) products, services, and processes (Selig, Gasser & Baltes, 2018:1). Moreover, these changes can be regarded as revolutionary, meaning that change occurs more rapidly and persistently in its frequency, which has a direct impact on all aspects of the organisation simultaneously (Kuratko & Audretsch, 2013:326). Consequently, the strategic ability of organisations to formulate and implement strategies is challenged because of the ambiguity of these revolutionary changes (Kuratko & Morris, 2018:49). Frequency assesses the organisation's entrepreneurial activities by measuring the number of new products, services and process innovations introduced over a specified period, for example, the past two years (Kuratko & Morris, 2018:49).

2.5.2 The degree of entrepreneurship

The degree of entrepreneurship is measured by observing to what extent proactiveness, innovativeness and risk-taking play a role in the organisation's EO. In this context, innovativeness relates to creative and novel solutions to opportunities and problems, where (new) technologies, processes, products and services are used to create these solutions. Concerning risk-taking, this involves the willingness to invest resources in opportunities with a reasonable to high chance of costly failure, even though these risks are primarily measurable and manageable. Finally, proactiveness refers to taking the initiative ahead of competitors or anticipating and responding to entrepreneurial opportunities, which requires the organisation to be persistent and resilient and have a high tolerance for failure (Kuratko & Audretsch, 2009:3; Kuratko & Morris, 2013:325; 2018:48; Sumiati, 2020:217).

To conclude, entrepreneurial intensity strengthens the organisation's dynamic capabilities by increasing and supporting entrepreneurial activities (Elia & Margherita, 2018:272; Selig et al., 2018:8).

2.6 ENTREPRENEURIAL PERFORMANCE

Performance measurement for entrepreneurs is an important topic. It is the subject of extensive discussion in academic and business circles, which seek to understand when and why some organisations perform better than others (Gupta & Wales, 2017:64; Kuratko & Morris, 2018:46; McGee & Peterson, 2019:720; Putniņš & Sauka, 2020:712). Kuratko and Morris (2018:48) define EP as follows:

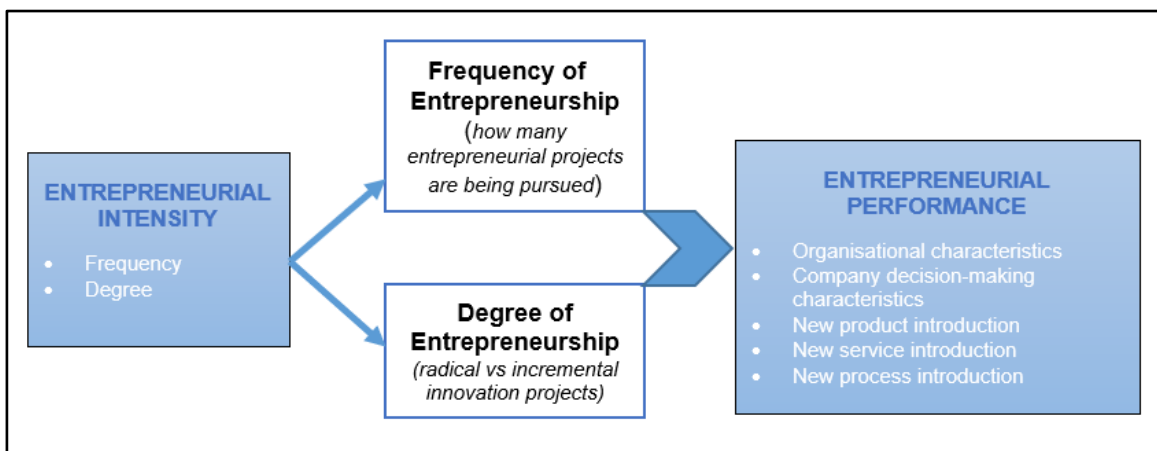
“The entrepreneurial performance of a company at a given point in time is reflected in its entrepreneurial intensity score. Entrepreneurial intensity is an extension of EO and is concerned with both the degree and frequency of entrepreneurship.”

Nevertheless, measuring performance remains a contentious subject, as there is little understanding (or agreement) of what performance constitutes (Gupta & Wales, 2017:64). Although it is generally accepted that entrepreneurial intensity is crucial for an organisation that wants to improve its performance, defining performance may not be that straightforward. It should not be generalised across industries (Kapepa, 2017:159). Furthermore, some argue that organisational performance differences are partly due to how firms reflect entrepreneurial tendencies (EO) through their management approach and activities (Anderson *et al.*, 2015:1579; Covin & Lumpkin, 2011:856). Measuring performance enables managers and researchers to assess how businesses excel over time, their performance compared to their competitors and how these organisations adapt to changing circumstances. Therefore, it is no surprise that management literature routinely uses organisational performance as a critical dependent variable (Anderson & Eshima, 2013:417; Engelen, Gupta, Stenger & Brettel, 2015:1070; Rauch *et al.*, 2009; Wales, Gupta & Mousa, 2013:358).

Even though entrepreneurship is generally accredited as a substantial contributor to economic growth (Urbano & Aparicio, 2016:34), more recently, greater attention has been directed at the type of entrepreneurship and how it will impact the different levels of the economy (Bosma & Kelley, 2019:23). Entrepreneurs who are likely to be impactful must recognise and exploit opportunities while having innovation as one of their defining characteristics (Davies & Van Vuuren, 2021:455).

In this context, impactful entrepreneurs are those who adopt a proactive, innovative and risk-taking approach, according to the literature on EO (Wales, 2016:4). In addition, EO is a strategic perspective that influences entrepreneurship activity towards innovation and organisational growth (Zehir et al., 2015:358). The organisation's performance can be benchmarked and tracked by establishing and comparing industry standards, developing strategies and examining the relationship between entrepreneurial actions and organisational performance (Morris & Kuratko, 2002:290). Figure 9 (p. 42) illustrates the relationship between entrepreneurial intensity and EP.

Figure 9: Critical variables for EP



Source: Adapted from Chitrakar (2019:4).

Entrepreneurs who are likely to be impactful must recognise and exploit opportunities while having innovation as one of their defining characteristics (Davies & Van Vuuren, 2021:455).

Morris and Kuratko (2002) argue that for EP to add value, regular measurement should be done, evaluating the outcome and, equally importantly, the process and experiences that lead to the outcome (Morris & Kuratko, 2002:288). Often, when it comes to entrepreneurship research, the ability of the organisation to perform is the supreme criterion of success or failure, both empirically and theoretically (Botha, Van Vuuren & Kunene, 2015:56).

In fact, firms can gain an edge in the market by using several generic strategies. For example, innovation can increase consumer value by lowering costs and improving organisational margins. It is possible, however, that more than EP and strategy may be required to explain firm performance (Linton & Kask, 2017:168).

Successful organisations often depend on overcoming resource constraints and choosing an appropriate entrepreneurial strategy depending on the EO. Consequently, the inner mechanisms between different dimensions of EO and EP are attracting attention (Gao *et al.*, 2018:178).

Furthermore, an entrepreneurial organisation can better identify opportunities and mobilise resources and knowledge to maximise its potential (Gillin, Gagliardi, Hougaz, Knowles & Langhammer, 2019:59). In this context, it is possible to draw a strong link between entrepreneurial activity and firm performance; moreover, it should be encouraged (Morris & Kuratko, 2002:290). Morris and Sexton (1996) developed the Entrepreneurial Performance Index, from which Morris and Kuratko (2002:292) present a valid and reliable measurement instrument to measure an organisation's innovativeness, orientation to risk taking and the degree to which it is proactive. They argue that by evaluating the degree and frequency of entrepreneurship within the organisation, EP can be measured at a certain point through its entrepreneurial intensity score (Ireland *et al.*, 2006b:22).

The concept of entrepreneurial health is at the heart of organisational entrepreneurship, grounded in its philosophy of understanding the phenomenon (Gillin *et al.*, 2019:61). To assess an organisation's corporate entrepreneurship environment and its performance level, an entrepreneurial health audit is conducted, which consists of 20 Likert-style questions divided into five sections based on organisational factors that can be used (Gillin *et al.*, 2019:61; Ireland *et al.*, 2006b:22).

The first 12 items in the questionnaire measure the organisation's degree of entrepreneurship, and the remaining items measure the frequency of entrepreneurship. The instrument can also measure the entrepreneurial intensity of different parts of an organisation, such as units, divisions, departments and organisational functions. The instrument is typically administered to many managerial designations, representing different functional areas within the organisation (Ireland *et al.*, 2006b:22; Kuratko *et al.*, 2011:378). Based on several studies (Ireland *et al.*, 2006b:22; Kuratko *et al.*, 2011:378; Morris & Kuratko, 2002:290; Morris & Sexton, 1996), and as it is powerful at gauging the degree and frequency of entrepreneurship at the organisational level, the Entrepreneurial Performance Index was used in this study to measure the organisation's EP.

The Entrepreneurial Performance Index questionnaire comprises five sections and is scaled between 1 and 5. Scores between 1 and 2 indicate low entrepreneurial activities, while a score of 3 indicates that the organisation does not support entrepreneurial activities. Conversely, scores between 4 and 5 indicate organisations that support entrepreneurial activities. The results provide insight into how employees engage in entrepreneurial activities in the context of innovative, risk-taking and proactive actions (Gillin *et al.*, 2019:62; Ireland *et al.*, 2006b:22). The five sections include:

- **Organisational characteristics:** This dimension measures the extent of the organisation's entrepreneurial trajectory, meaning its objective high frequency of innovative projects compared to a low degree of incremental versus radical innovation or a combination thereof. Also, is the organisation's propensity towards risk-taking, or is it more a case of 'live-and-let-live' regarding its competitors?
- **Top-level decision-making characteristics:** These relate to how pragmatic, cautious or conservative management's attitude is towards problem-solving. Furthermore, what is the attitude of the organisation's management towards opportunities, and from what source will innovative input most likely come (top, middle or first-level managers)? Also, are the organisation's managers aware of their role in stimulating entrepreneurial behaviour?
- **New product introduction:** How many new products has the organisation introduced to the market in the last two to three years? Regarding its market positioning, in which market spaces does the firm consider itself the first mover of product innovation and in which market spaces will it accept being a fast second mover of product innovation?
- **New service introduction:** How many new services did the organisation introduce to the market in the last two to three years? How many new services were introduced compared to the improvement of existing services? What is the level of innovation of the organisation's service (frequency versus degree) compared to its competitors?
- **New process introduction:** How significant will the new process introduction be to the organisation over the next two to three years? Process innovation may include the development of more efficient and effective ways to produce the organisation's goods and services. Additionally, a new process may refer to new systems for managing customer service or inventories and improving processes for collecting receivables for significant new sales or distribution.

It is worth mentioning that the measure of entrepreneurial intensity will differ depending on the industry.

For example, organisations operating in turbulent markets tend to have greater entrepreneurial intensity, as higher levels of organisational performance are generally associated with entrepreneurial intensity (Kuratko *et al.*, 2011:378). In other words, higher levels of entrepreneurial intensity do not necessarily lead to more significant benefits. The organisation's primary goal should be to achieve high entrepreneurial intensity within its market (Kuratko *et al.*, 2011:378).

2.7 RESOURCE-BASED VIEW OF THE ORGANISATION

Regarding performance, an issue often overlooked relates to how an organisation uses its resources as a competitive advantage to prevent failure and improve performance. Furthermore, prior research has often taken a narrow perspective of measuring success and performance. Although some studies emphasise the importance of external stakeholders and corporate responsibility as possible influences on improving performance, others take a resource-based approach by considering strategies derived from internal resources (Campbell & Park, 2017:302). So, what is missing?

This study argued that a resource and relationship-driven approach should be considered when examining an organisation's strategic management in an integrated way. In order to develop the concept of entrepreneurial intensity, the resource-based theory needs to consider the relationship between applying resources, cost opportunism and the realisation of strategic project outputs. Therefore, completing its projects will guarantee the organisation's performance (Kapepa, 2017:85).

2.8 PROJECTS AND ENTREPRENEURSHIP – LINKING INTERCONNECTED COMMUNITIES

At this point, presenting a brief theoretical discussion on entrepreneurship might be unconventional. However, this researcher believes that entrepreneurship is intrinsically linked to projects and their practices, and to understand this relationship, research and practice must be allied.

Entrepreneurship as a discipline and academic science has a rich historical evolution spanning over 800 years. The French coined the term *entrepreneurship*, meaning “to do or undertake” something, in the 12th century. Furthermore, the advancement of entrepreneurship as a practice can be attributed to abolishing the feudal system. Even though most of the practice ended by the 15th century, remnants of feudalism lingered in France until the French Revolution in the 1790s and in Central and Eastern Europe as late as the 1850s. The emergence of different business types, such as the banking system in France, Italy and Germany, can be considered the catalyst for entrepreneurship (Ferreira *et al.*, 2019:183). Thornton (2019:3) discuss several role players who have contributed richly to the development of entrepreneurship in practice and theory, such as Richard Cantillon (1755) – argued by some to be the first economic theorist – who defined the entrepreneur as an “adventurer” and Adam Smith (1776), who regarded the entrepreneur as an economic agent transforming demand into supply.

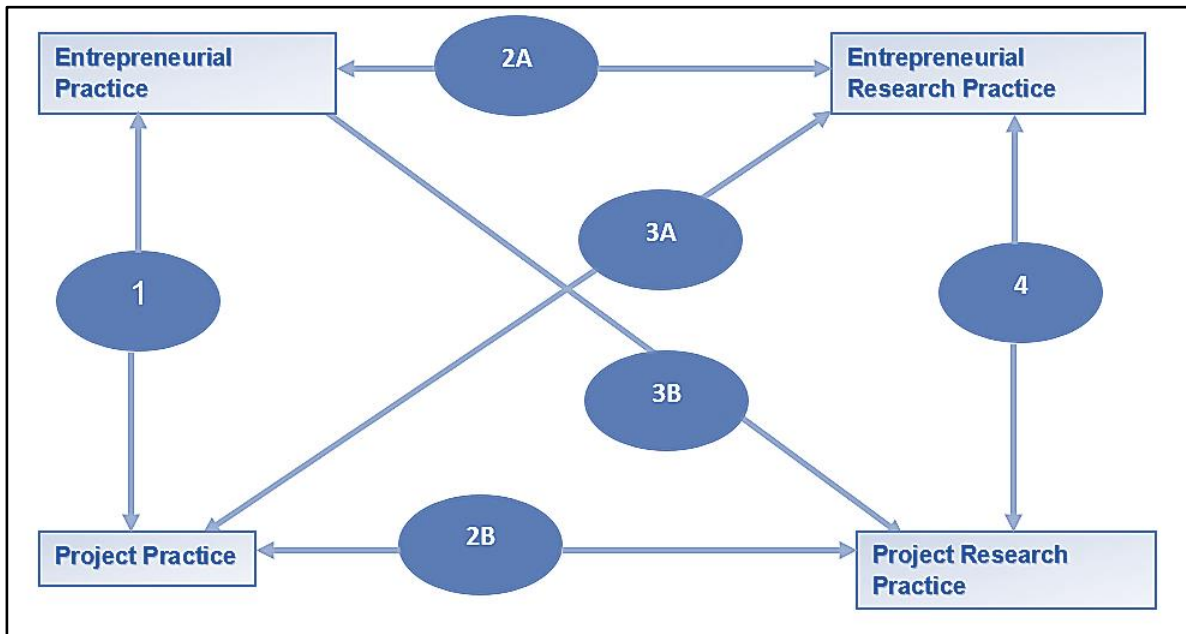
The early 1800s offered economists such as Jean Baptist Say, Jeremy Bentham and John Stuart Mill, who continued to popularise the concept of entrepreneurship (Ferreira *et al.*, 2019:183). When the manufacturing of goods moved from homes and villages to larger factories in cities (between 1760 and 1840), the beginning of the First Industrial Revolution in Europe and the United States was signalled. This shift brought about cultural changes as people moved from rural areas to big cities to pursue work opportunities. The First Industrial Revolution set new technologies and transportation modes and a different way of life in motion.

More recently (if one considers 1934 recent), Joseph Alois Schumpeter (1883–1950) submitted a profound entrepreneurship theory at the beginning of the 20th century. Schumpeter's theory holds that entrepreneurship encompasses various business activities, such as planning, organisation, financing and production. Taking responsibility for the success and failure of entrepreneurial endeavours is fundamental. Even more than a century since its formulation, Schumpeter's theory of entrepreneurship can be considered the forerunner of contemporary entrepreneurship (Mehmood, Alzoubi & Ahmed, 2019:2).

However, Schumpeter's view on innovation was of interest to this study, which considered entrepreneurship as an instigator of market-based systems, meaning that one of the primary functions of an enterprise is to innovate (create something new), which results in businesses

that catalyse market economy (Akter, Rahman & Radicic, 2019:7). Therefore, a prima facie case could be made for investigating the relationship between projects and entrepreneurship. Figure 10 (p. 48) illustrates the theoretical and practical relationship between projects and entrepreneurship.

Figure 10: Interconnections of two practice fields and two research fields



Source: Kuura *et al.* (2014:223).

Casson and Wadeson (2007:298) argue that there is a strong relationship between an opportunity and a project, meaning that potential opportunities are associated with unexploited projects in a clearly defined set of possibilities. However, it is well known that opportunity is an essential concept of entrepreneurship, although some find it difficult to comprehend why it plays such a central role. The confusion might stem from the apparent pool of untapped opportunities still waiting to be discovered. Therefore, why have these opportunities not been exploited if there is an unlimited source of opportunities?

Thus, by defining an opportunity as an unexploited project, Casson and Wadeson (2007:287) postulate that identifying opportunities is nothing more than discovering and perusing possible projects. In this context, projects are considered more functional compared to opportunities, mainly because projects are expressed more logically, while opportunities are more intuitive (Klein, 2008:183; Kuura *et al.*, 2014:222).

Analysing the relationship between projects and entrepreneurship reveals that some concepts are interchangeably used and linked in various ways; simply put, the domains of projects and entrepreneurship often cross. According to Kuura *et al.* (2014:222), EO, new product development and temporary organisation theory are three of the most famous and influential linking concepts. In their argument, the authors state that these three concepts are often directly or indirectly used to link projects and entrepreneurship. Considering that there is significant commonality between projects and entrepreneurship in practice, it is somewhat perplexing to note that these two domains are distinct and separate within the academic field. The following section elaborates on the interconnectedness and commonalities of the two domains.

2.8.1 Relationship between two practices fields (Link 1)

When faced with innovation-based competition, the organisation's project approach is a matter of strategic effectiveness. This will allow for strategic decision-making in developing (new) products and services and identifying the right market segment. Therefore, it can be argued that innovation is the conceptual link between entrepreneurship and projects. Kuura *et al.* (2014:223) further argue that various stages of the organisation's life cycle, such as relocation, renewal or (re) development, meet significant project criteria. In addition, the authors argue that organisations with project-by-project activities tend to perform and direct their operations more effectively. Therefore, organisations can be more entrepreneurial when incorporating projects through teams or fostering intrapreneurship (Kuura *et al.*, 2014:223).

2.8.2 Relationship between practice and research with one field (Links 2A & 2B)

The Type 2 links in Figure 10 (p. 48) depict well-established areas of contention between research and practice within one field. Kuura *et al.* (2014:216) postulate that, in terms of practice and research, projects (Link 2B) as a field are better situated than entrepreneurship (Link 2A). Practitioners are more likely to be interested in the research findings, whereas academics are more interested in the problem. An action research approach to entrepreneurship represents a participative approach that promotes organisational behavioural changes.

Therefore, considering the projects' main objective and design are to bring about change, an apparent relationship between entrepreneurial actions and projects can be drawn (Kuura *et al.*, 2014:223; Leitch, 2007:144–168).

2.8.3 Relationship between practice in one field and research in another (Links 3A & 3B)

In theory and practice, both fields (projects and entrepreneurship) have used various concepts to describe related activities. For example, in their classical work, Clarysse and Moray (2004:57) investigated the formation of entrepreneurial teams and identified four phases in the entrepreneurial process: idea, pre-start-up, start-up and post-start-up phases. Several times, these authors refer to the first stage (idea) as a project stage, using terms like team and leader, based on entrepreneurial rather than project management literature. Kuura *et al.*'s (2014) research was conducted from a different perspective: project practice on entrepreneurship practice. Although the cross-links (Types 3A and 3B in Figure 10 (p. 47)) exhibit great potential, these relationships seldom exist in practice. This may be due to path dependency because research in a particular field creates traditions governed by specific research streams (Kuura *et al.*, 2014:225).

2.8.4 Relationship between two research fields (Link 4)

Studies in contemporary research tend to be fragmented, primarily because knowledge and theory are mostly measured within specific research domains. This is also in keeping with the growing specialisation of research and academic channels for publication (Kuura *et al.*, 2014:225). It could explain why Martens and Carvalho (2016:29-30) argue that there is a gap in empirical research on the relationship between entrepreneurship and project management.

Therefore, exploring research fields where both domains converge could be mutually beneficial. The academic field can be advanced through entrepreneurship. Project management can grow from a practical perspective, for example, by studying project management in small and medium enterprises and start-ups (Trokić, 2016:1). Cross examining these two scholarly fields is crucial. However, it is likewise important to note that there are some common and exclusive topics in the two fields (Tamberg,

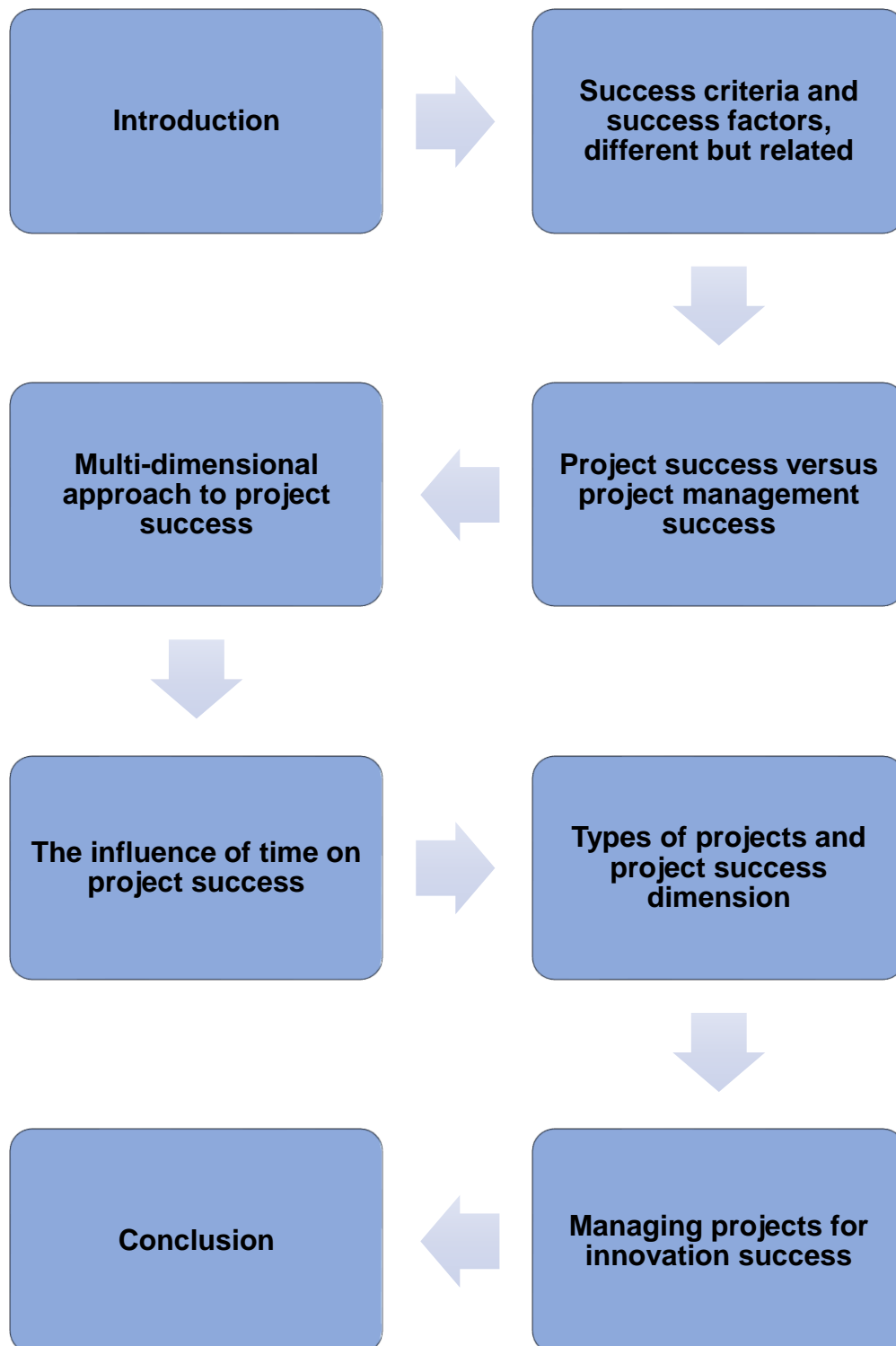
Kuura & Soosaar, 2021:26). For example, both fields deal with finance and financial management. However, risk management is almost absent in the entrepreneurship arena, and in the project research arena, developing economics is scarcely covered (Kuura *et al.*, 2014:225). Furthermore, gender studies are becoming increasingly evident in project literature, such as that of Aga, Noorderhaven and Vallejo (2016:806), who examined the mechanisms by which transformational leadership behaviours influence the success of projects, yet regrettably, most of the time, without using the extensive coverage provided in the entrepreneurial literature. The issue of gendered entrepreneurship is relatively well-developed in economics, and there could be much to learn from researchers in the project management field (Kuura *et al.*, 2014:225; Xheneti & Blackburn, 2011:367-388).

2.9 CONCLUSION

Based on this chapter's information and rich historical foundation, many may consider entrepreneurship the alchemy for economic prosperity. In contemporary vernacular, entrepreneurship is almost regarded as a magic wand that can transform dysfunctional economies into technologically innovative job-creating mechanisms (Gaddefors & Anderson, 2017:270).

From the state president to the gogo selling magwinya on the street corner, all profess that entrepreneurship is the answer. Then why was South Africa's official unemployment rate at 35.3% in the fourth quarter of 2021 (Statistics South Africa), and more pressing, why do 70% to 80% of businesses fail within five years? The conviction of this research is that there is an urgent need for a review of the relationship between project practices and entrepreneurship and a break from the current academic silos. Even though interdisciplinary research is a popular concept in academia, such endeavours are not well supported in practice. Considering the proximity between the two fields based on the analysis presented in the study, and since there is no known empirical evidence focusing on project success' impact on EP, the outcome should be insightful. The following section provides more detail concerning project success, further validating the relationship between EP and project success.

CHAPTER 3 PROJECT SUCCESS



3.1 INTRODUCTION

As a general rule, the organisational theory assumes that organisations are or should be permanent. However, many organisational activities are more temporal, focusing on projects as strategic tools. This study has highlighted the importance of incorporating time into organisational practices to achieve success and sustained performance based on traditional project management knowledge. Project success is essential in converting corporate strategy into action, and as a result, organisations increasingly recognise the necessity of projects (Frefer *et al.*, 2018:1).

Therefore, asking the question ‘What is project success?’ has become even more relevant during an era when organisations deal progressively with projects (Albert, Balve & Spang, 2017:796; Alvarenga, Branco, do Valle, Soares & da Silveira e Silva, 2018:1). Since projects can be flexible, responsive and effective at addressing uncertainty, risks and complexity, they have become essential to managing change in organisations, emphasising that the goal of a project is to make a positive impact on the organisation, improve performance and increase profits through growth (Berssaneti & Carvalho, 2015:638; Gomes, Carvalho & Romão, 2021:90; Hanisch & Wald, 2011:6; Mir & Pinnington, 2014:204).

However, even though projects can improve productivity and create strategies to compete more effectively (Cullen & Parker, 2015:608), some scholars argue that failure to strategically manage key projects may limit the organisation’s ability to compete effectively or even result in failure. The main contributing factor for this could be that project management generally focuses more on efficiency than effectiveness (Berssaneti & Carvalho, 2015:639). Adnan, Hashim, Marhani, Asri & Johari (2013:398) consider time, cost and quality as temporary criteria because they measure efficiency during the delivery stage of the project; in contrast, Nixon, Harrington and Parker (2012:205) question the value of measuring project success only in terms of time, cost and scope.

Therefore, even if a project is completed on time, within budget and with an acceptable quality parameter, Mavi and Standing (2018:751) contend that success, in this regard, can be subjective since if the project does not meet the customers’ needs or does not move the organisation forward, success is arbitrary.

Furthermore, Berssaneti and Carvalho (2015:639) reviewed project success in relation to critical success factors and maturity models in project management. Granted, Serrador and Turner (2015:30) view that project success should be judged according to two criteria: whether the project met its scope, time, budget and specifications, and whether the organisation can achieve its strategic objectives that improve performance in the years following project completion. For projects to succeed, some scholars maintain that organisations ought to incorporate relevant structures and processes to support their project management capabilities, ultimately resulting in a self-reinforcing process (Cullen & Parker, 2015:608).

Despite a large body of literature reviewing project success, the terms used to describe it and measure it remain ambiguous and inconsistent (Frefer *et al.*, 2018:1). Some regard project success as an “elusive concept” (Orhof, Shenhar & Dori, 2013:961). However, in their pioneering work, Müller and Turner (2007:299) question whether different success criteria are relevant to different types of projects. Mir and Pinnington (2014:203) evaluate project success in various ways to provide a coherent explanation and understanding of the concept. Thus, from the information presented, it is easy to see why practitioners and researchers consider a clear understanding of project success a priority and why the subject remains so appealing (Brookes, Butler, Dey & Clark, 2014:231; Müller & Jugdev, 2012:758).

3.2 SUCCESS CRITERIA AND SUCCESS FACTORS – DIFFERENT BUT RELATED

There are many misconceptions and oversimplifications about what project success constitutes. It also depends heavily on who is involved in the evaluation and the context in which success is measured (Frefer *et al.*, 2018:2).

Although project success criteria and success factors are different concepts, the literature often confuses the issue by using them interchangeably. Thus, to avoid a mistaken or incorrect interpretation, both are briefly discussed to provide the theoretical basis for project success (Korbijn, 2014:9). Generally, there are two paths that research on project success can take: project success factors and project success criteria (Albert *et al.*, 2017:797; Han, Yusof, Ismail & Aun, 2012:91).

It can be argued that determining project success factors is pointless until the project success criteria are established, emphasising that even if all success factors were identified, success would be incomplete without establishing relevant project success criteria (Frefer *et al.*, 2018:1). Furthermore, researchers widely recognise success factors and success criteria as prerequisites for studying project success (Alvarenga *et al.*, 2018:1; Berssaneti & Carvalho, 2015:640; Castro, Bahli, Barcaui & Figueiredo, 2021:789; Müller & Jugdev, 2012:758; Müller & Turner, 2007:299). In their pivotal work, Collins and Baccarini (2004:212) state that a distinction must be made between success criteria and success factors to measure success truly. For that reason, drawing from the literature, the following section assists the reader in understanding what project success factors and success criteria are in the context of this study. Success criteria are quantifiable, while success factors facilitate the actions of the criteria actions.

3.2.1 Project success criteria

Convention dictates that cost, time and quality define project success criteria, which Serrador and Turner (2015:31) refer to as project efficiency: How successfully was the project managed? However, these criteria are no longer sufficient (Frefer *et al.*, 2018:2). Project success criteria are generally considered to be the dependent variable, which represents the principles, standards, or measures of success or failure for a project. These criteria answer the question: How does one measure the success of a project? (Korbijn, 2014:9; Lamprou & Vagiona, 2022:251).

3.2.2 Project success factors

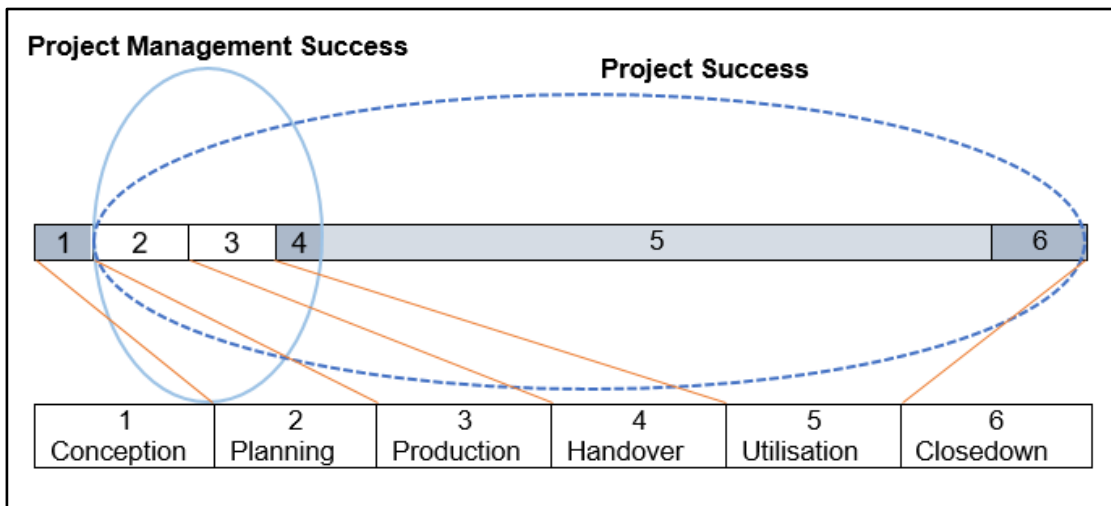
The successful performance of an individual, department or organisation is influenced by a limited number of factors (Frefer *et al.*, 2018:2). A limited number of factors influence the successful performance of an individual, department or organisation, and when influenced, project success factors increase the likelihood of success (Frefer *et al.*, 2018:2). Despite these factors contributing to a project's success or failure, they do not determine its measure. Furthermore, these factors address the question: What immediate actions must be suitable for a project to succeed? (Korbijn, 2014:9; Lamprou & Vagiona, 2022:251).

3.3 PROJECT SUCCESS VERSUS PROJECT MANAGEMENT SUCCESS

Project success tends to be viewed as a single homogeneous concept in mainstream project management literature, suggesting that when achieved, project management was successful (Korbijn, 2014:14). This perception is understandable and not surprising when viewed in context. It is greatly influenced by the Project Management Body of Knowledge definition of project management: “the application of knowledge, skills, tools and techniques to project activities to meet the project requirement” (Project Management Institute, 2013:5). Project success is not exclusively the result of successful project management, as the following section clarifies. In their seminal work, Munns and Bjeirmi (1996:85) illustrate how the organisation's various stakeholders (internal and external) interact during the project's life cycle. There are, however, several third-party role players who can significantly influence the outcome of a project, such as statutory authorities, media outlets, environmental groups and members of the public.

Figure 11 illustrates how success is distinguished between the project and the project management perspectives.

Figure 11: Project versus project management success



Source: Korbijn (2014:14).

3.3.1 Project management success

Project management success is considered against the traditional measures of performance: cost, time and quality of the inputs and output of a project

(Al-Shaaby & Almessabi, 2018:1; Bond-Barnard, Fletcher & Steyn, 2018:432), which Castro *et al.* (2021:790) still consider relevant as project success criteria. However, even though efficient project management processes (managing time, cost and quality) can increase the likelihood of projects being completed, it does not guarantee success (Frefer *et al.*, 2018:1). However, Korbijn (2014:15) points out that since the project team only manages a small part of the entire project, placing all the responsibility for success with the team is unrealistic. Furthermore, in their work, Collins and Baccarini (2004:213) highlight that project management success criteria (time, cost and quality) are subordinate to the goal and objectives of project success factors.

3.3.2 Project success

The focus and consideration of success in a project-oriented organisation should be on team dynamics, project management processes, organisational and environmental factors, resources and other technical factors (Al-Shaaby & Almessabi, 2018:2; Sudhakar, 2016:164).

Project success focuses on the organisation's strategic goals and objectives in terms of its product success, which deals with the goal, purpose and effect of the final product result (Al-Shaaby & Almessabi, 2018:1; Frefer *et al.*, 2018:1). Finally, project success is influenced by the time frame during which each success dimension is measured (Korbijn, 2014:15).

In conclusion, academics and practitioners often refer to Drucker's (1995) famous statement: "Management is doing things right; leadership is doing the right things". This study, therefore, interpreted project management success in the context of efficiency and leadership as project success in the context of effectiveness (Zidane & Olsson, 2017:623).

3.4 MULTIDIMENSIONAL APPROACH TO PROJECT SUCCESS

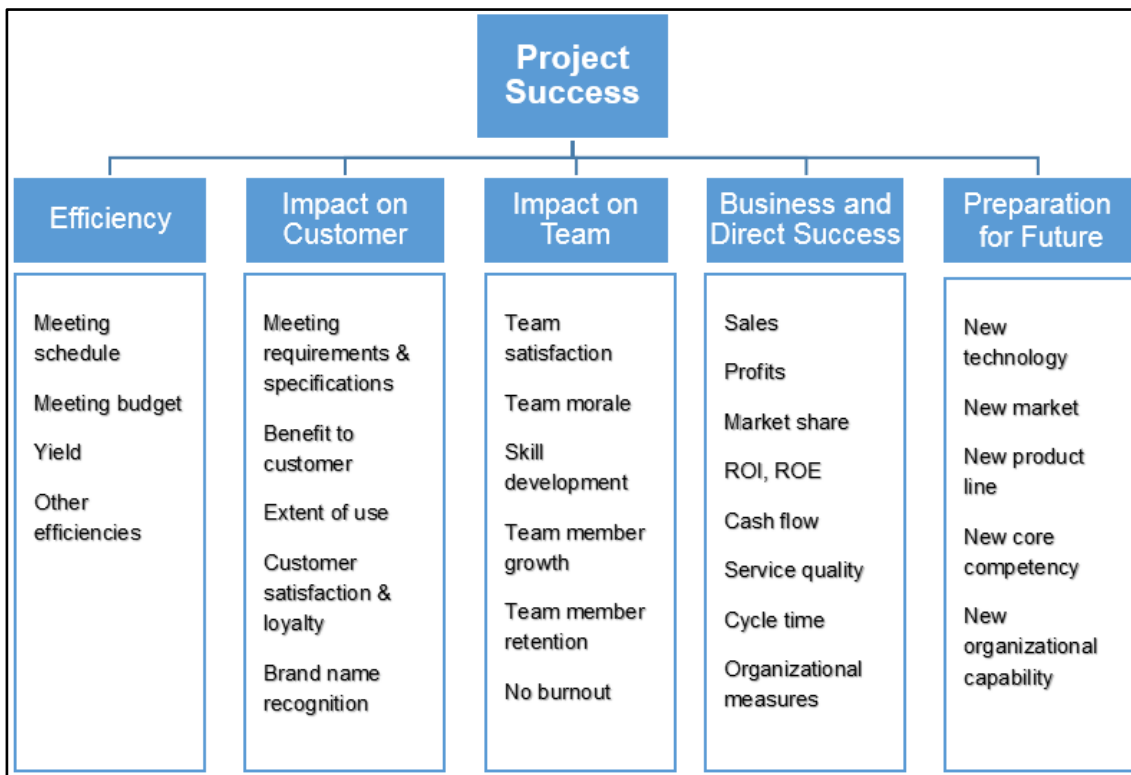
In this study, the multidimensional model variables, as presented by Shenhar and Dvir (2007:25–27), formed the independent variable to contextualise project success, which focuses on overall success based on how the project addresses key expectations of stakeholders and how well the project achieves its strategic objectives (Ahmed & Azmi bin Mohamad, 2016:56; Serrador & Turner, 2015:31).

Based on several years of research, Shenhar and Dvir (2007:25-27) developed a five-point multidimensional project success framework: project efficiency, impact on the customer, impact on the team, direct business and organisational success, and preparation for the future.

This framework can analyse projects and improve their outcome or communicate project information between stakeholders (Nuseibah, Saha, Olaso & Wolff, 2018:12). Furthermore, these dimensions can be used in assessing the success of a project for the short-term aspect of project management efficiency and the longer-term aspect of the project results, namely effectiveness and impact (Das & Khanapuri, 2019:337; Ika & Donnelly, 2017:47).

As illustrated in Figure 12, the remainder of this section elaborates on these five dimensions and how their sub-measures warrant project success. Other dimensions may be relevant; however, these dimensions represent a broad spectrum of project scenarios and cover most cases and time horizons.

Figure 12: Multidimensional approach to project success



Source: Shenhar and Dvir (2007:27).

3.4.1 Project efficiency

Zidane and Olsson (2017:621) state that in the vernacular, effective, effectual, efficient and efficacious all refer to producing some result; however, these terms are not easily interchangeable. Based on Shenhar and Dvir's (2007:27) interpretation of project success, the project efficiency dimension is a short-term subjective measure to evaluate whether the project was completed on time, in scope and within budget (Ahmed, Mohamad & Ahmad, 2016:161; Williams, Ashill, Naumann & Jackson, 2015:1836). In comparison, Yamin and Sim (2016:487) consider a project efficient when it incurs the least possible expenditure to accomplish its objectives.

Consequently, companies that manage projects efficiently can gain a competitive advantage over their competitors by providing their products and services more quickly or at a lower cost (Cooke-Davies, Crawford & Lechler, 2009:110). Even though efficient project management does not guarantee project success, efficient resource management makes sense for an organisation in the long run (Ahmed *et al.*, 2016:56; Shenhar & Dvir, 2007:26).

3.4.2 Impact on the customer

Customer satisfaction is considered to be the most crucial success dimension when evaluating project success (Albert *et al.*, 2017:800; Berssaneti & Carvalho, 2015:640; Dvir *et al.*, 2006:39; Serrador & Turner, 2015:30; Shenhar & Dvir, 2007:28; Zwikael & Meredith, 2019:1750). The dimension of impact on customers is measured by assessing functional requirements, technical specifications, the level of customer satisfaction, the level of customer usage, and the level of customer loyalty (Ahmed *et al.*, 2016:161). Furthermore, this dimension represents key role players whose judgement is vital when evaluating project success. Therefore, this dimension should establish clearly how the project results will improve customer satisfaction and organisational performance (Ahmed *et al.*, 2016:56; Peled & Dvir, 2012:319; Shenhar & Dvir, 2007:27).

3.4.3 Impact on the team

This dimension assesses how team satisfaction, morale, overall team loyalty and the retention of team members at the end of the project impact the organisation and project

completion collectively (Ahmed & Azmi bin Mohamad, 2016:56; Ahmed *et al.*, 2016:161; Martens *et al.*, 2018:257). Furthermore, team performance is evaluated based on an organisation's indirect investments in employee training, the level of growth and learning achieved by members, and the skills that team members acquire (Shenhar & Dvir, 2007:28; Zwikael & Meredith, 2019:1746).

3.4.4 Business and direct success

Mir and Pinnington (2014:204) state that business and direct success are the project's commercial value and market share benefits. Martens and Carvalho (2016:30) argue that this dimension reviews the direct result of developing the project, including increased sales, revenue and profitability. An organisation's business plan often considers these aspects when outlining expected profits, growth and product sales (Ahmed *et al.*, 2016:162; Shenhar & Dvir, 2007:27). Furthermore, Martens *et al.* (2018:257) propose that this dimension assesses to what degree the project contributes to the organisation's development.

3.4.5 Preparing for the future

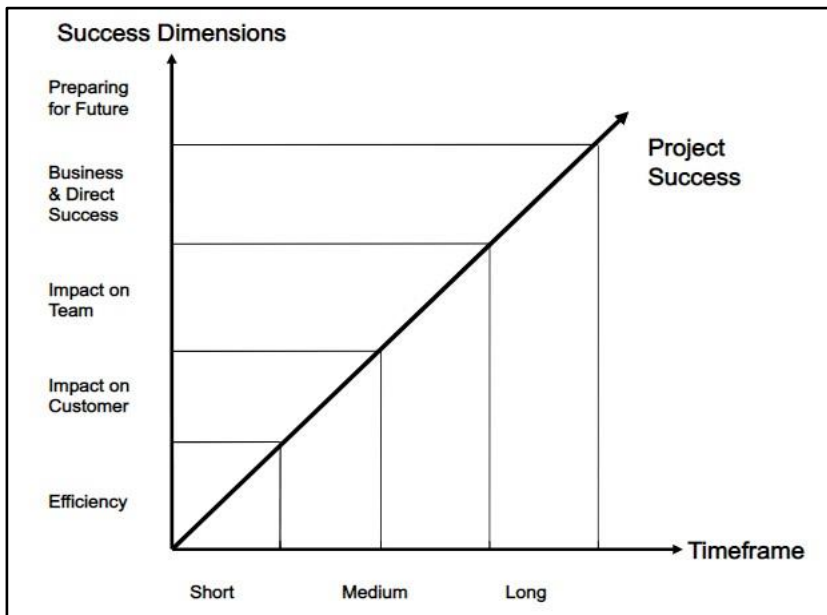
Martens and Carvalho (2016:31) suggest that this dimension allows projects to contribute to the organisation's continuous improvement and sustainable performance. Furthermore, this dimension focuses on the long-term benefits that the project can provide the organisation through new opportunities and how well it can assist the organisation in developing its infrastructure for the future. These types of projects may include new product lines, new market segments or new technology development, while infrastructure for the future may focus on organisational competencies, systems and new technologies (Ahmed *et al.*, 2016:162; Shenhar & Dvir 2007:28).

In conclusion, project success can be measured through five dimensions representing a universal framework for all projects. However, it is worth noting that even though all dimensions can be significant, their relative importance varies from project to project.

3.5 THE INFLUENCE OF TIME ON PROJECT SUCCESS

Shenhar and Dvir (2007:29) pose the question: Which of the five dimensions is most important? As the nature of the dimensions suggests, the relative importance of each dimension will depend on when it is assessed. Serrador and Turner (2015:30) also state that assessing project success is time-dependent. Likewise, Turner and Zolin (2012:88) investigate the success of large projects by considering multiple stakeholders over multiple time frames. In the contemporary organisation, project success has evolved into a dynamic concept encompassing short and long-term implications, which can only be assessed holistically after a certain period (Korbijn, 2014:11). Zwikael and Meredith (2019:1746) also highlight that conditions change as time progresses, and the project is viewed retrospectively; therefore, the perception of success can shift. Thus, time is a crucial consideration since some stakeholders are only interested in the project for a short period, for example, the project manager, while others, like project funders, are more interested in the long term (Joslin & Müller, 2015:1379). Because of that, a multidimensional approach should be adopted to achieve the project's success, considering the diverse interests and perspectives of the project participants and the project's time frame (Shenhar & Holzmann, 2017:30). Therefore, to answer Shenhar and Dvir's (2007:29) original question, the researcher has used Figure 13 (p.62) to illustrate that even though the dimensions of project success can overlap in practice, the time impact on success evaluations varies across the dimensions.

Figure 13: Time frames of success dimensions



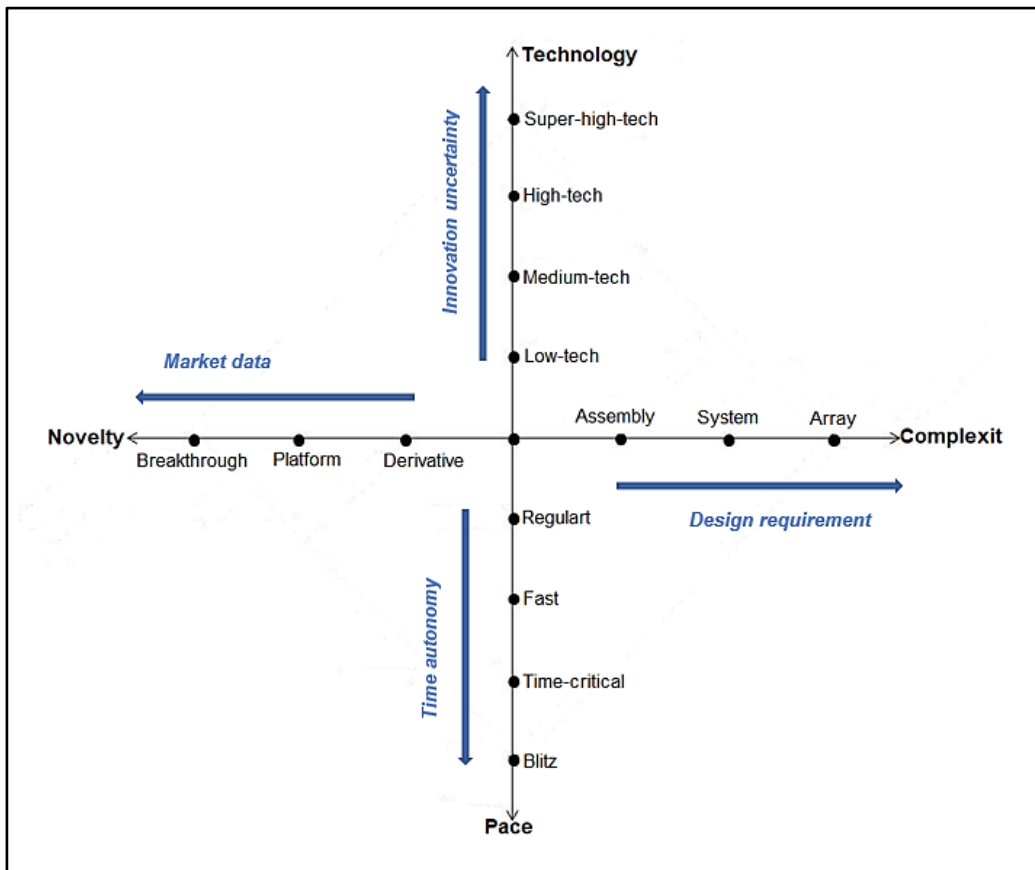
Source: Shenhar and Dvir (2007:30).

Shenhar and Dvir (2007:29-30) explain that project efficiency is the most crucial dimension during the short term, particularly during project execution. However, this dimension of relevance decreases as soon as the project is completed. The second and third dimensions (impact on the customer and the team) become more relevant when the project is in progress because the team can exert the most influence to ensure that the customer's needs will be met. Business and direct success come into play after one to two years because significant sales and market share or profit gained can only be evaluated after the completion of the project. Preparation for the future portrays the long-term benefits of the project for the organisation and can only be assessed three to five years after completion of the project (Cruz Villazón, Sastoque Pinilla, Otegi Olaso, Toledo Gandarias & López de Lacalle, 2020:2; Shaeik & Müller, 2014:25).

3.6 TYPES OF PROJECTS AND PROJECT SUCCESS DIMENSION

The type of project being managed influences project success. When managers make decisions about projects and how to run them, they can use the Novelty-Technology-Complexity-Pace (NTCP) as a framework for decision-making, such as selecting suitable projects, allocating resources, managing risk and choosing a management style. The framework dimensions consist of three to four levels along a spectrum within which a project might fall (Shenhar & Dvir, 2007:46). See Figure 14.

Figure 14: The NTCP framework



Source: Adapted from Shenhar and Dvir (2007:47).

In the project management field, experts quickly point out that it is challenging to define success, and it is equally misleading to assume that project managers necessarily produce successful projects (Orhof *et al.*, 2013:962). The NTCP framework consists of four levels, each representing a specific type of project. Combining these four levels creates project profiles with specific planning and execution requirements (Sanyal & Iyyunni, 2014:3).

Based on the NTCP framework classification of a project, finding the correct type of project management approach leads to a higher success rate and a lower probability of a well-managed, efficient project failing to meet its objectives (Cole, 2017:621; Orhof *et al.*, 2013:962). The model also allows for the methodology of project management against different kinds of projects by illustrating the type of project being undertaken and indicating what measures of success should be prioritised (Vasconcellos & de Oliveira Moraes, 2015:2).

Shenhar and Dvir's (2007:47) framework highlights the different managerial approaches to various types of projects. The following section elaborates on the NTCP framework and how it affects project success.

3.6.1 Project novelty and project success

Novelty can be expressed in terms of performance characteristics, differences in product features or unique industrial practices (Sanyal & Iyynni, 2014:1). In general, derivative products can be used to extend the lifespan of an existing profitable product, which may result in attracting new customers. Alternatively, a 'break new ground' product may be introduced to the market, allowing the organisation to tap into an entirely new market and expose a product to a customer who might otherwise not be exposed to it. Thus, clear expectations ought to be set at the beginning of the project. In other words, the organisation needs to decide what project success constitutes (Shenhar & Dvir, 2007:68), as per Table 2.

Table 2: Project novelty and project success

Success dimensions and possible failure	Level of project novelty		
	Derivative	Platform	Breakthrough
Efficiency	High efficiency is critical; no room for overruns	Time to market is important for competitive advantage	Efficiency is difficult to achieve and may not be critical (unless competitors work on the same idea); overruns are likely
Impact on the customer	Gaining additional customers and market segments	Having high strategic impact on the customer; retaining previous-generation customers	Outstanding improvements in customer's life and work
Impact on the team	Team members extend their experience in quick product modification	Team members gain technical and managerial experience in introducing new generations	Team members explore new fields and gain extensive experience in unknown markets
Business and direct success	Extend life of existing products; additional revenues and cash cow current products	High strategic impact on the business expectation of years of revenue and the building of additional derivatives	Long-term, significant business success may come later after initial products have been tested and refined

Success dimensions and possible failure	Level of project novelty		
	Derivative	Platform	Breakthrough
Preparation for the future	Almost none	Maintain a strategic position in the market	Creating new markets and establishing substantial leadership positions
Possible failure and risk	Low risk. Risk may involve being late and gaining only marginal value	Medium risk. Risk may involve failing to make enough progress compared to the previous generation, or even missing a generation in the market	Highest risk. Risk involves failing to address a real need of customers, sell the idea to customers or assess real market size

Source: Shenhar and Dvir (2007:69).

3.6.2 Project technology (uncertainty) and project success

Thus, the risk of failure increases with each level of uncertainty, starting with low and moderate and moving up to the highest levels in high-tech and super-high-tech projects. At these levels, technology may fail to achieve success expectations, lead to project overruns or even expose unknown safety hazards (Shenhar & Dvir, 2007:84). A summary of the main differences between the levels of project technology is shown in Table 3. In addition, the table indicates the types of projects found in each industry and descriptions of the typical products for each level (Shenhar & Dvir, 2007:88).

Table 3: Technology (uncertainty) and project success

Success dimensions and possible risk	Level of technological (uncertainty)			
	Low-tech	Medium-tech	High-tech	Super-high-tech
Efficiency	High efficacy is critical	Efficiency is important	Overruns may happen; do not expect them but accept them when they happen	High probability of overruns
Impact on the customer	Standard product	Functional product; added value to customers	Significantly improves customer's capability	Quantum leap in customer effectiveness

Impact on the team	Extend team experience in industry	Extend team experience in quick design and product modifications	Extend team learning in applying new technologies	Building technical leaders of unknown technological development
Business and direct success	Reasonable profit	Moderate profit. Medium return on investment	High profit. High market share	Outstanding business results in the long- run; market leadership position
Preparation for the future	Almost none	Gains additional organisational capabilities	New product line; new market	Leadership position; new core technologies
Possible failure and risk	Low risk. No specific risk from technology used	Moderate risk from technology	High risk of delays, overruns and undesirable performance from using new technologies for the first time	Extensive risk from unknown technologies; excessive delays and cost overruns, with possible product failure or failure to achieve its expected performance

Source: Shenhar and Dvir (2007:85).

3.6.3 Project complexity and project success

In de Rezende's and Blackwell's (2019:127) view, organisations find it more challenging to deliver successful projects primarily because of the complexity of contemporary projects.

From an organisational perspective, the complexity dimension measures the effort required to design, introduce and manufacture a product (Shenhar *et al.*, 2020:116). At the lower end of the assembly chain, a single functional group or a temporary organisation is usually responsible for these projects, the designs and the build. At the system level, the main contractor is responsible for delivering the end product; however, the entire project can be split among several subcontractors, either within the organisation or externally (Shenhar *et al.*, 2020:116). Because an array project may involve integrating several separate projects, it requires the management of multiple segments and systems. For that reason, array projects are often managed in a temporary organisation, set as a separate entity that formally coordinates the efforts of all activities involved (Hanisch & Wald, 2014:198; Shenhar

& Dvir, 2007:108). Table 4 summarises the significant differences between the three project complexity levels and the possible risks.

Table 4: Project characteristics according to project complexity

Characteristic	Level of project complexity		
	Assembly	System	Array
Customer	Consumers or the main contractor of a larger project	Consumers, industry, public government or military agencies	Public organisation, government or defence agencies
Form of purchase and delivery	Direct purchase of simple contract; contract ends after delivery of product	Complex contract; payment of milestones; delivery includes logistical support	Multiple contracts; evolutionary delivery as various segments are competed and paid for
Project organisations	Performed within one organisation, usually under a single functional group; almost no administrative staff in project organisations	A main contractor, usually organised in a matrix or pure project form; many internal and external subcontractors; various technical and administrative staff	An umbrella organisation, usually a programme office to coordinate sub-projects, many staff experts: administrative, financial, legal and project risk
Planning	Simple tools, often handled manually; rarely more than 100 activities in the network	Complex planning; advanced computerised tools and software planning packages; hundreds or thousands of activities	A central master plan with separate plans for sub-projects; advanced computerised tools; total programme may include up to 10 000 activities
Control and reporting	Simple, informal, in-house control; reporting to management or main contractors	Tight, formal control on technical, financial and schedule issues; reviews with customers and managers	Master or central control by programme office; separate additional control for sub-projects by contractor; many reports and meetings with contractors
Documentation	Simple, mostly technical document	Many technical and formal managerial documents	Mostly managerial and legal documents at programme office level; technical and managerial documents at lower level

Management style, attitude and focus	Mostly informal style; family-like atmosphere; typical focus on cost, quality delivery and manufacturing (when relevant)	Formal and bureaucratic style; some informal relationships with subcontractors and customers; sometimes dealing with political and inter-organisational issues; major focus needed on system requirements, system design and system integration	Formal, tight bureaucracy; high awareness of political, environmental, legal and social issues; strong focus needed on programme policy coordination and political decision-makers
Policies, standards and guidelines	Typically, no particular standards or policies used	Industry or corporate standards are followed	Programme must develop its own policies and standards; no common industry standard exit for programmes of this size
Possible risk	Low risk. Missing requirements	Medium to high risk. Risk involves difficulty in integrating all sub-systems as an optimal functioning system; difficulty with complex configuration and mutual influences between systems, or risk of recovering the investment	Highest risk. Risk involves weak coordination between the systems that make up the array and failure to accomplish its mission; misalignment with the environmental, political or economic climate or extensive spending of resources in case of overruns

Source: Shenhar and Dvir (2007:114).

3.6.4 Project pace and project success

In all projects, time is a significant factor, so the pace of the project indicates how severe its deadline is (Shenhar *et al.*, 2020:116). The concept of project pace is usually defined by management and is perceived objectively rather than subjectively (Sanyal & Iyyunni, 2014:1).

In contrast to fast/competitive projects, time-critical projects focus on quickly exploiting the window of opportunity. In contrast, blitz projects focus on addressing and resolving any crisis as soon as possible. Underestimating project pace has varying degrees of risk, from no risk for regular project pace, escalating to potential loss of market share in fast/competitive projects.

For blitz projects, the risk impact can be more severe, which may result in significant damage or even loss of lives. In terms of project pace, the organizational structure, how people engage in the project, and the process and procedures applied to determine project success, as illustrated in Table 5 (Shenhar & Dvir, 2007:132).

Table 5: Characteristics of project pace levels

Characteristics	Level of project pace			
	Regular	Fast/competitive	Time-critical	Blitz
Focus	No particular focus	Strategically focused on time market	Centred on a specific window of opportunity	Swift solution of crisis
Possible risk	No particular risk owing to time of completion	Risk of being late to market and letting competitors take part of the business	Risk of project failure if target date not met	Risk of slow response to crisis, which may significantly increase the damage
Organisations	No unique structure	Mostly matrix teams; strong coordination of subcontractors	Pure project is desirable; often co-located with skunkworks	Immediate and special task force; team has great autonomy
Personnel	People not assigned to more urgent jobs	Qualified for the job	Specifically picked	Immediately available; taken out and released from other assignments
Procedures and processes	No specific attention	Structured procedures; new concepts and methods for shortening development cycle	Shortened, simple; tight schedule control; parallel and redundant process to guarantee meeting the deadline	No bureaucracy, no documentation; work goes on around the clock; can benefit from prepared contingency plans but must be ready to improvise
Top management involvement	Management by expectation	Go-ahead approvals at major project phases and gates	Highly involved; engaged in tight monitoring on time	Available at all times; constantly providing support, resources and needed decisions

Source: Shenhar and Dvir (2007:132).

3.7 MANAGING PROJECTS FOR INNOVATION SUCCESS

Although there is an abundance of literature available on innovation, establishing a satisfactory definition and describing its nature has proven challenging, even though contemporary vernacular often refers to innovation as an action that can be transformative. Because innovation is a multidimensional concept, its meaning and definition will differ depending on the perspective from which it is interpreted (Edwards-Schachter, 2018:65).

As mentioned in Chapter 1, contemporary project-oriented organisations must select the 'right' project to ensure that all stakeholder objectives are met and that these projects will improve and sustain the organisation's competitive performance (Gemünden *et al.*, 2018:150). Further, people encounter projects and innovations throughout their personal and professional lives (Gemünden *et al.*, 2018:148). According to the concept of project-orientation organisations, one should evaluate projects from a strategic perspective not only as a tool for completing business tasks but also as a means to improve organisational performance (Gareis, 2007:124). The reason that organisations initiate projects is predominantly based on their innovation-strategic objectives. However, these projects are not limited to new business innovation; they can also include expanding its current business, reinventing/redeveloping mature products, establishing new infrastructure or addressing problems within the organisations that hamper their ability to grow or perform (Shenhar & Dvir, 2007:140).

Even though there is a substantial and informative body of literature on innovation (Dziallas & Blind, 2019:3; Popa *et al.*, 2017:134; Prajogo, 2014:241; Sirén, Parida, Frishammar & Wincent, 2020:23; Zhang *et al.*, 2018:897), research on the relationship between innovation and project practices is rare at best. However, as the previous discussion indicated, organisations directly depend on the project's success to ensure its innovation results in performance and growth. Furthermore, some scholars argue that the competitive environment in which contemporary organisations find themselves has triggered a revolution in how firms view innovation (Lenfle, 2016:47; Shenhar, Holzmann, Melamed & Zhao, 2016:62). Trends such as rapid technological changes, shortening of product lifecycles and new markets are rapidly emerging, which supports the need for innovation.

Nevertheless, as technology and markets grow exponentially, companies must intensify their innovation efforts to meet customer needs faster (Shenhar *et al.*, 2020:113). Although all innovations begin with an idea, they are projected to take those ideas to the markets and into the hands of users, turning them into valuable products or services (Shenhar & Dvir, 2007:4).

However, regardless of how good an idea is, all efforts may only succeed if the organisation has a robust project design that can quickly bring that idea to market at an affordable cost and a reasonable level of risk. Therefore, organisations should view innovation and project initiatives as one entity and empower all relevant teams to transform innovative ideas into successful projects (Shenhar *et al.*, 2020:114). At the metaphorical intersection between the disciplines of projects and entrepreneurship, Di Muro and Turner (2018:969) believe that project management continues to evolve from an operational discipline towards an organisational strategy. Therefore, in the context of projects and innovation, Di Muro and Turner (2018:973) ask: “Do we understand what is needed?”, “Is the knowledge available or can it be procured within the “state of the art?”, “Does the solution fit, or does it violate the mores and values of the intended users?”

The rest of this section elaborates on managing projects in the context of innovation.

3.7.1 Types of innovation – a multidimensional phenomenon

Although Schumpeter considers innovation in the context of the product, process and business model (Estrin *et al.*, 2022:272), the debate about what innovation constitutes has not since diminished, and in the common vernacular, the term *innovation* is often ambiguous (Kogabayev & Maziliauskas, 2017:60).

The most popular distinction presented for the types of innovation can be found in Christensen’s (1997) seminal work. The most popular distinction describes incremental and radical innovations related to the changes introduced and exploitation and exploration as they relate to technological innovations, processes or services (Shenhar *et al.*, 2020:114). In essence, incremental or sustaining innovation refers to a relatively minor change in existing products or processes. In contrast, radical or disruptive innovation relates to changes based on exclusive new products or processes (Shenhar *et al.*, 2016:66).

Edwards-Schachter (2018:72) adds that a radical innovation “changes the rules of the game”. An innovative idea can be incremental regarding the new knowledge needed but radical relative to the other performance achieved. Based on the premise that innovation is both a process and a product, Shenhar *et al.* (2020:115) describe innovation as the commercialisation of a concept: a concept successfully delivered to its intended market.

3.7.2 Project selection

The pool of projects from which the organisation can select usually exceeds the limited resource availability, contributing mainly to the organisation’s selection dilemma (Kaiser, El Arbi & Ahlemann, 2015:126). Shenhar and Dvir (2007:141) propose that the first step when selecting a project should be to divide the projects based on the organisation’s goals and customer groups. Categorising the projects according to their goals, objectives and customers is depicted in Table 6.

Table 6: The goal-customer matrix

Customer type	Operational project	Strategic project
External	Extending the life of an existing product; product improvement	New product introduction
Internal	Improve an existing internal process; maintain an internal process; solve a particular problem; gain access to a specific capability or technology	A new internal infrastructure project such as enterprise resource planning, a major internal utility or capital project, or a research project

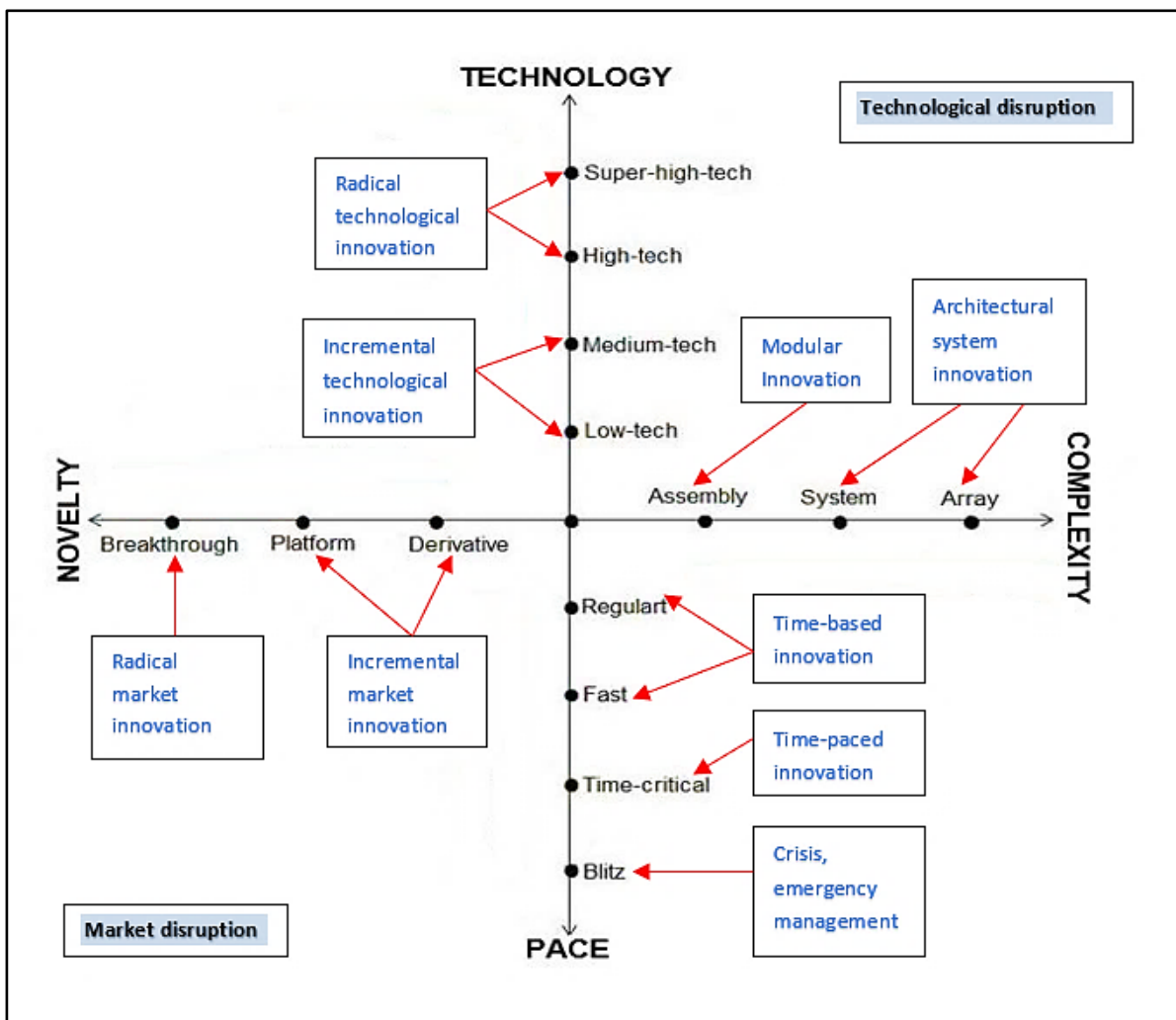
Source: Shenhar and Dvir (2007:141).

The NTCP framework dimensions help to demonstrate the difference between operational and strategic projects. Operational projects are almost always derivatives, while strategic projects are often breakthroughs or platforms. Technical uncertainty for operational projects typically does not exceed medium-tech, whereas it can extend across the entire technological uncertainty spectrum for strategic projects. In contrast, strategic projects are rarely undertaken during a crisis because their more significant novelty cannot be accomplished in a blitz mode; operational projects, however, can be urgent (Mehta, 2016:39; Shenhar & Dvir, 2007:141).

3.7.3 Linking innovation types and project types

Even though almost all types of innovation require different implementation methods, it remains a challenge for organisations to adapt their 'how to' activities to differing types of innovation. Moreover, identifying the differences between radical and incremental innovation is only sometimes straightforward, adding to the confusion that often leads to failed projects (Shenhar & Dvir, 2007:147). Figure 15 presents the NTCP framework combining innovation mapping, innovation and project type to bridge this gap.

Figure 15: Joint framework of innovation and project management



Source: Adapted from Shenhar *et al.* (2020:118).

Most innovations can be mapped to the dimensions of the NTCP framework model, which provides a logical understanding of how to manage them more effectively and efficiently.

There is a degree of novelty, technology, complexity and innovation pace associated with each project type (Shenhar *et al.*, 2020:118).

3.7.3.1 Novelty – innovation

Project novelty addresses the degree of market changes; incremental innovation is either derivative or a platform project, while radical innovation is considered a breakthrough project (Pisano, 2015:48; Shenhar & Dvir, 2007:148). The level of market uncertainty for derivatives and platform innovation is low since customer needs are well known (Holzmann, Olson, Vendetti & Shenhar, 2018:5). However, it is significantly more challenging to establish initial requirements for new-to-market products since these markets represent radical innovation. Radical innovation calls for more in-depth market trials before final requirements can be determined (Shenhar *et al.*, 2020:119).

3.7.3.2 Technology – innovation

According to this dimension, low-tech and medium-tech represent incremental technological innovation. In contrast, high-tech and super-high-tech represent radical change (Holzmann *et al.*, 2018:5). In the case of high-tech and super-high-tech, technologies are either new to the organisation or, in extreme cases, do not yet exist. In addition to being high in risk and uncertainty, these types of technological innovation require lengthy development times and testing during the project's development phase (Shenhar & Dvir, 2007:148). However, for these innovations, because exact requirements are rarely known before project initiation, the best course of action would be to develop a prototype as soon as possible that can provide valuable customer feedback (Pisano, 2015:48; Rotolo, Hicks & Martin, 2015:1827; Shenhar *et al.*, 2020:119).

3.7.3.3 Complexity – innovation

Complexity innovation would typically be related to product modules, components and structure complexities (Oyama, Learmonth & Chao, 2015:3-4). Project types for these complex innovations relate to components or assemblies on the axis. On the other hand, architectural or system innovations typically include the development or improvement.

On the other hand, architectural or system innovations typically include the development or improvement of systems and, in extreme cases, complete system collections which relate more to the array project type on the diamond axis (Holzmann *et al.*, 2018:5). Also, system and array projects have different impacts on an organisation regarding how it structures or coordinates the projects. Projects involving system integration often span several groups and functions of the organisation, which call for strong coordination and solid integration of skills to ensure the entire system works at its best. In contrast, array innovations are more complex and usually consist of megaprojects spanning multiple organisations or countries. Successful megaprojects require an incredibly high degree of coordination. The project requires a clear vision, total alignment among all parties and adaptation to its unique and complex environment (Shenhar & Holzmann, 2017:30).

3.7.3.4 Pace – innovation

This dimension relates to how important time is for the completion of the project. Regular projects are typically not associated with time constraints; however, fast/competitive projects place a premium on time, focus on completing the project before competitors or, in innovation terms, gain a competitive edge. Here, minor delays will not jeopardise the success of the project. In contrast, a time-critical pace is the first radical time constraint, in which even a tiny delay threatens success. Finally, as a result of their extreme pace, blitz projects are usually undertaken just before a crisis erupts and where time is of the utmost importance for completing the project (Holzmann *et al.*, 2018:5; Shenhar & Dvir, 2007:148; Shenhar *et al.*, 2020:119).

3.8 CONCLUSION

This chapter contextualised project success as a multidimensional framework, as developed by Shenhar and Dvir (2007:27). Following that, a brief explanation of the differences between project success and project management success was provided. This explanation provided more context for the five dimensions of project success and the relative importance and influence that time has on project success. Even though it was not claimed that one specific set of measurements could be applied universally to every project, it was hypothesised that individual projects would use specific measures in different ways and with

varying degrees of importance. Also elaborated in this chapter was the relationship between projects and innovation. Innovation is generally considered to be part of an organisation's orientation. However, this study argued that projects transform innovative concepts into reality. Consequently, integrating innovation and project management is critical as innovation becomes increasingly important for long-term organisational performance (Shenhar *et al.*, 2020:119).

It, therefore, makes sense to combine innovative ideas with project types to improve project practices and prepare for future success. Finally, the information presented fits well with interdisciplinary research. Combining various fields of study has become increasingly popular when a single discipline cannot find a solution.

CHAPTER 4 PROJECT RISK



4.1 INTRODUCTION

Initiating and growing a business is fraught with uncertainty and risk (Agunwah, 2019:57). Despite its wide use, the term *risk* is a semantically overloaded term that applies to a wide range of domains, making it difficult to convey its meaning unless you understand the context (Denney, 2020:278).

In terms of the organisation, risk management is traditionally viewed as an essential defensive measure which aims to minimise economic damage (Mohammed & Knapkova, 2016:272). Furthermore, there may also be a relationship between perceived risk and the tendency of entrepreneurs to take risks. Expressed differently, the risk associated with a given project is mainly determined by the entrepreneur's perception of its outcome.

One could argue that the perceived degree of risk is primarily influenced by the entrepreneur's experiences (Agunwah, 2019:61). Thus, in the milieu of projects, the primary objective of risk management is to increase the probability of success. Since projects are performed within complex, multidisciplinary, and challenging environments, organisations acknowledge that managing risk will add value to a project (Rampini, Takia & Berssaneti, 2019:895). On that point, Fewings and Henjewe (2019:275) reason that it is rather challenging to define value because measuring value is innately subjective. Therefore, the ability to define project value significantly depends on the perception of all relevant stakeholders. For value management to be successful, it requires a broad perspective, starting with the end goal and identifying the means to achieve it, according to Willumsen, Oehmen, Stingl and Geraldi (2019:731).

In addition, stakeholders can only assess the value of a project with a thorough understanding of the context in which it takes place since value creation is subjective and context dependent.

Since projects frequently contain technical, engineering, innovative or strategic content, risk management differs from other organisation processes where there is enough data to adopt fundamental approaches (Agunwah, 2019:59). Conversely, some scholars (Kutsch, Browning & Hall, 2014:26; Sirisomboonsuk, Gu, Cao & Burns, 2018:296) argue that many organisations do not expect their project risk management practices to contribute significant

value. Instead of executing risk practices in an organised and systematic manner, they perform them as a 'tick-the-box exercise'. Although there are various tools and techniques available for managing risk and, in general, managers consider managing risk as critical for the project's success, the reality seems to be that, for the most part, managing project risk is often ineffective (Kutsch *et al.*, 2014:26).

For that reason, Shenhar and Dvir (2007:31), who have contributed substantially to this field, argue that while all projects involve a certain degree of risk, uncertainty and complexity are not the only criteria to determine the level of risk concerning the project type. As part of that reason, Shenhar and Dvir (2007:31), study, they examined different projects in different organisations and the issues facing project practitioners. Furthermore, their research postulates that the fundamental challenge facing project managers is failing to acknowledge the diversity of projects (Sidney, 2019:16), from which they developed the NTCP-Diamond framework. This framework is a context-free model, meaning that irrespective of industry or organisation type, the model can capture a vast spectrum of project types (Ghatak & Garg, 2019:11; Mehta, 2016:37). Furthermore, the NTCP-Diamond framework includes other risk factors such as novelty (innovation), technology (uncertainty), complexity (scope) and pace (time), which incorporate 'traditional' aspects of project practices and acknowledge other vital considerations for the success of the project and to reflect the organisation's strategic objective in terms of its performance, therefore adding value (Das & Khanapuri, 2019:323; Hartono *et al.*, 2019:2; Willumsen *et al.*, 2019:732).

However, despite a notable development in the literature on project risk management (Hastak & Shaked, 2000:59; Lechler, Edington & Gao, 2012:59; Li & Zou, 2011:1205; Porananond & Thawesaengkulthai, 2014:100; Salavati, Tuyserkani, Mousavi, Falahi & Abdi, 2016:418), very few studies have considered analysing project risk from the perspective of project characteristics and managerial style.

Rather than only considering the traditional methods for measuring project risk (complexity and uncertainty), this study argued a need for a more specifically tailored approach when evaluating project risk to highlight how it relates to project success and performance. Therefore, it is imperative to understand the connection and differences between complexity, uncertainty and risk. It will assist management in identifying the right strategy when faced

with project challenges (Kermanshachi, Dao, Shane & Anderson, 2016:604). The following section elaborates on the difference between complexity, uncertainty and risk in this study.

4.2 COMPLEXITY, UNCERTAINTY AND RISK

Even though there is a large body of knowledge and substantial literature on project complexity, risk and uncertainty, a clear connection between these concepts has yet to be established (Kermanshachi *et al.*, 2016:604). Also, there must be an agreement on whether project risk and uncertainty directly influence project complexity. While some regard complexity as a critical element of uncertainty, some argue that understanding project complexity is fundamental to reducing project risk (Elliott & Dickson, 2011:156).

4.2.1 Uncertainty

In his influential work, the economist Frank Knight (1921) distinguished between decision making under risk and uncertainty. Knight proposed that decision-making under risk arises when a range of possible results can be assigned probabilities.

By contrast, decision-making under uncertainty occurs when insufficient information is available to assign statistical probabilities (Elliott & Dickson, 2011:156). Several other scholars make similar distinctions. Uncertainty can loosely be defined as a condition in which a project's future depends on an unknown outcome, which can either positively or negatively impact the project (Petit, 2012:540). Contrary to this, risk is a quantitative and measured state of uncertainty that can result in significant negative consequences. Hillson and Murray-Webster (2012:5) state that risk is not synonymous with uncertainty, whether the uncertainty consists of unexpected variances or deliberate ambiguity. Therefore, the fundamental distinction between risk and uncertainty is how risk considers consequences. A simplistic explanation for risk is 'uncertainty that matters' because uncertainty with no consequence presents no risk; therefore, the risk does not matter.

However, it is pertinent to note that uncertainty relates to the outcome, irrespective of its measurability or whether it has a positive or negative impact (Elliott & Dickson, 2011:156; Kermanshachi *et al.*, 2016:605). Shenhar and Dvir (2007:171) intentionally distinguish between risk and uncertainty. They argue that although risk and uncertainty are related, they

are different. Uncertainty deals with the unknown, whereas risk relates to what can happen. Because of a project's unique nature, it is vital to note that uncertainty is a fundamental factor. In contrast, risk factors consist of time constraints, complexity and resource requirements, to name a few.

4.2.2 Complexity

Generally, complexity refers to something that has many parts and interacts with those parts in different ways (de Rezende & Blackwell, 2019:129). It can be argued that project managers generally do not understand how to maximise performance in complex projects due to the lack of a cohesive project theory and difficulty defining complexity (Daniel & Daniel, 2018:184).

For the most part, complexity is interpreted in the context of structural complexity, uncertainty, dynamics, pace and socio-political complexity (Daniel & Daniel, 2018:186). Furthermore, the interaction between variables and components in a project may result in complex and unexpected results owing to various interdependent feedback loops (Antunes & Gonzalez, 2015:216; Bakhshi, Ireland & Gorod, 2016:1199). Thus, based on the assumed complexity, the project manager will find it challenging to plan the project without conducting a compressive risk assessment (Agunwah, 2019:59).

Simply put, the primary difference between complexity and risk resides in what is known and unknown about the project (Ahern, Leavy & Byrne, 2014:1374). Therefore, managing risk is measuring the known and unknown, whereas complexity focuses on the known aspects and how they relate to the project (Kermanshachi *et al.*, 2016:605). Furthermore, risk and complexity change during a project's life cycle, but how they change is fundamentally different. The complexity of a project increases as more knowns emerge during various phases. However, these types of complexity are not a risk but rather an event that must be managed effectively for the project to succeed (Kermanshachi *et al.*, 2016:605). The objective is to manage the project's complexity to avoid negative aspects while taking advantage of positive ones (Hartono, 2018:735). Although uncertainty is one of the fundamental characteristics of a project, complexity is also a key aspect of a project. Therefore, a more comprehensive analysis of project challenges can be reached by incorporating risk and complexity (Hartono, 2018:754).

Firstly, a project's complexity increases when risk-based and uncertainty-based decision-making needs to be clearly defined and understood, and secondly, when management does or does not trust their probability estimates (Elliott & Dickson, 2011:156).

Therefore, a specific method is required to measure and manage the relationship between project complexity, project risk and project uncertainty to allow organisations to manage and mitigate project risk more efficiently, as risk becomes an essential moderator for performance (Zwikael *et al.*, 2014:436).

4.3 BALANCING RISK AND OPPORTUNITIES

Despite the natural tendency to focus on adverse risks, managing opportunities should also be a priority. In project management, an opportunity is an event that can positively contribute to project objectives. These opportunities are identified and assessed based on their likelihood and impact, and contingency plans and funds are actioned in case they are encountered (Gray & Larson, 2018:223).

Moreover, an organisation's ability to manage risk and opportunity effectively is increasingly viewed as a competitive differentiation factor, helping it to thrive in a demanding economic environment (Mathrani & Mathrani, 2013:476). As a consequence of the significant effects that risk factors can have on the performance of an organisation, risk management is regarded as an essential component of an organisation's strategic goals (Ivascu & Cioca, 2014:77).

Therefore, the crux of managing opportunity is creating an environment where innovative ideas with tangible benefits can flourish. Thus, rather than performing risk management in isolation, it must be integrated into the organisation's strategic processes (Lennon, 2015:5). Effective risk and opportunity management adds value to the organisation's performance (Wu & Olson, 2013:1581). Although risk analysis is performed on all projects, very few projects manage all aspects of uncertainty that should be considered. This is because it is generally known that uncertainties have both upsides and downsides; usually, the downside can be managed, but the potential upside (opportunities) has not been fully exploited

(Johansen, Olsson, Jergeas & Rolstadås, 2019:3). Therefore, to complete any project, balancing risk and opportunity is critical.

While project-based organisations need to chase opportunities, they must also consider the risks involved in seizing those opportunities (Johansen *et al.*, 2019:5). Therefore, the ultimate objective of project management is to constantly move uncertainty away from risk and towards opportunity (Petravičius, 2008:105).

A project's end goal can be positively impacted by opportunity management. Opportunities are closely associated with innovation and change, and flexibility is vital if the project is to succeed (Malvik, Johansen, Torp & Olsson, 2021:1). In order to determine whether the identified opportunities are advantageous, the associated risk needs to be assessed. Another factor to consider in the relationship between risk and opportunity is the maturity of the process, as established processes pose fewer risks and opportunities (Ivascu & Cioca, 2014:78).

Identification of opportunities allows organisations to eliminate vague ideas prior to consuming resources while at the same time developing powerful ideas that affect the organisation's performance positively (Ivascu & Cioca, 2014:80; Rolstadås, Johansen, Bjerke & Malvik, 2019:633). The NTCP-Diamond framework, which draws upon classic contingency theory (Grötsch, Blome & Schleper, 2013:2842; Sauser, Reilly & Shenhar, 2009:666), allows project practitioners to take preventive actions by adjusting to the project's environment (tasks and risks) to ensure that the organisation's goals and objectives are met (Bentahar & Ika, 2019:830; Shenhar & Dvir, 2007:52,143).

Table 7 (p. 84) illustrates how the NTCP-Diamond framework can be applied to evaluate each project's potential benefits and risks. Each NTCP dimension represents a different risk and benefit to the project.

Table 7: Potential risks and opportunities

Diamond dimension	Potential benefit and opportunity	Potential risks or difficulties
Novelty	Innovative ideas; new markets and customers	Misinterpreting customer needs; missing market opportunities
Technology	Improved performance; new users of technology	Technical failure; lack of technical skills
Complexity	Scope of business based on size	Substantial losses; coordination and integration difficulties
Pace	Timing advantage	Risk of delay; risk of errors owing to speed

Source: Shenhar and Dvir (2007:144).

4.4 PROJECT RISK DIMENSIONS

The contingency theory suggests that organisational success depends on how well the organisation can respond to environmental changes and that there should be a congruence between the organisation and its environment (McAdam *et al.*, 2019:195).

The term *novelty* generally refers to the newness of the innovation, its market and the potential customers who could adopt it. Moreover, novelty refers to the uncertainty of a project's goals, which could directly impact the project's risk and potential opportunity (Jesus, Itami, Segantine & Junior, 2021:385). Consequently, novelty (innovation) indicates the risk of misinterpreting customers' requirements. This dimension can be risky and opportunistic if the congruency between the environment and the organisation is not interpreted correctly (Shenhar & Dvir, 2007:144).

Technology represents the most significant source of unpredictability (Jesus *et al.*, 2021:385). Although the use of technology allows an organisation to improve its performance relative to its current method or past methodology – thereby increasing its ability to innovate efficiently and effectively (Shenhar & Dvir, 2007:144) – technology implementation and the technology necessary to produce the final product pose the most significant risk in this dimension.

A simple approach to identifying the various levels of *complexity* is to use a hierarchy of systems and subsystems to define them. The level of complexity relates directly to the system's scope and the organisation and formality of project management (Jesus *et al.*, 2021:386). Depending on the project's scope, complexity can increase or decrease the level of financial investment (Lennon, 2015:7). In terms of complexity, there is a risk of the scope associated with the project not being integrated in a coordinated way, which will require a better formulation of processes and activities to ensure project success (Shenhar & Dvir, 2007:144).

Pace identifies how projects differ in urgency and the risk or consequences of not meeting a required deadline. In addition, pace reveals the project environment's autonomy, bureaucracy, decision-making speed and senior management engagement (Jesus *et al.*, 2021:386). Improving the project's pace or time dimension can gain a first-to-market advantage. The first-to-market strategy may not always be beneficial if the product or service is very new (novel), as there may be more significant opportunities for competition that are second or third to market (Mehta, 2016:39). Continuous delays are an obvious risk that may ultimately cause the project to fail (Shenhar & Dvir, 2007:144).

4.5 SECTOR-SPECIFIC ANALYSIS OF PROJECT RISK

This study investigated project risk in various sectors, such as engineering projects (EP), IT, innovation projects and new product development.

Based on information obtained from the literature, this study has classified these sectors broadly: engineering (mining, electrical, civil and construction), Information Technology (IT), Innovation projects, New product development projects and Finance and business services sector. Next, a brief overview of how these sectors relate to project risk is presented.

4.5.1 Engineering projects

Lima da Silva, Vieira, Melhado and de Carvalho (2019:202) state that uncertainties often characterise the engineering process owing to the lack of information, inaccuracy and the complexity of the project or unexpected factors that may crop up during the project. All these factors can have a significant impact on the success of the project.

Furthermore, Ghatak and Garg (2019:6) regard engineering projects as significant risk based on the project life cycle because engineering projects mainly obtain capital from external sources (banks, investors or intuitions). These projects usually have a longer payback period and require extensive cash flow (Shishodia, Dixit & Verma, 2018:895). During construction, the most common risks include site preparations and safety procedures, workers' safety, environmental conditions, geotechnical conditions and construction procedures (More & Hirlekar, 2017:2007).

4.5.2 Information technology projects

It is generally accepted that IT project risks are complex and include variables such as multi-objective tasks, inadequate or insufficient data, software development lifecycle, organisational environment, stakeholder involvement and team knowledge (Pramanik, Mondal & Haldar, 2020:71; Shishodia *et al.*, 2018:895). In addition, IT risks are often associated with advanced techniques, equipment and materials (More & Hirlekar, 2017:2007).

4.5.3 Innovation projects

It is generally accepted that IT project risks are complex and include variables such as multi-objective tasks, inadequate or insufficient data, software development lifecycle, organisational environment, stakeholder involvement, and team knowledge (Shishodia *et al.*, 2018:895; Pramanik, Mondal & Haldar, 2020:71). In addition, IT risks are often associated with advanced techniques, equipment and materials (More & Hirlekar, 2017:2007).

4.5.4 New product development projects

The risk classification for new product development may provide the ability to adapt to current technology required by the market and the production and organisation thereof. To effectively manage the risk associated with new product development projects, management needs to bridge the gap between ideal risk management procedures and actual conditions in new product development projects (Kutsch *et al.*, 2014:27).

4.5.5 Finance and business services sector

Even though many factors play a role in financial risks, such as economic conditions, market instability, politics and exchange-rate fluctuations (More & Hirlekar, 2017:2007), managing and forecasting a project's cash flow is crucial to ensure the project's success. Lu, Won and Cheng (2016:3) argue that engineering projects fail because of inadequate liquidity to achieve daily activities, not poor management of other resources, which can undermine the project's long-term sustainability.

Also, technological and innovative activities create additional financial risks for the organisation. Furthermore, the increased complexity of financial products and services leads to an information imbalance between suppliers and consumers, transforming existing risks into new risks (Mishchenko, Naumenkova, Mishchenko & Dorofiev, 2021:191). Organisations are shifting from production to customer solutions for higher returns and growth opportunities. This shift, known as servitisation, is not easy to implement and does not always produce positive results; further, poor implementation consistently leads to undesirable outcomes. Creating a successful service business requires clearly understanding the organisation's strategic objectives. Competitive advantage will be determined more by how companies implement their strategies than by the strategies themselves (Rabetino, Kohtamäki & Gebauer, 2017:144).

4.6 PROJECT RISK ASSESSMENT

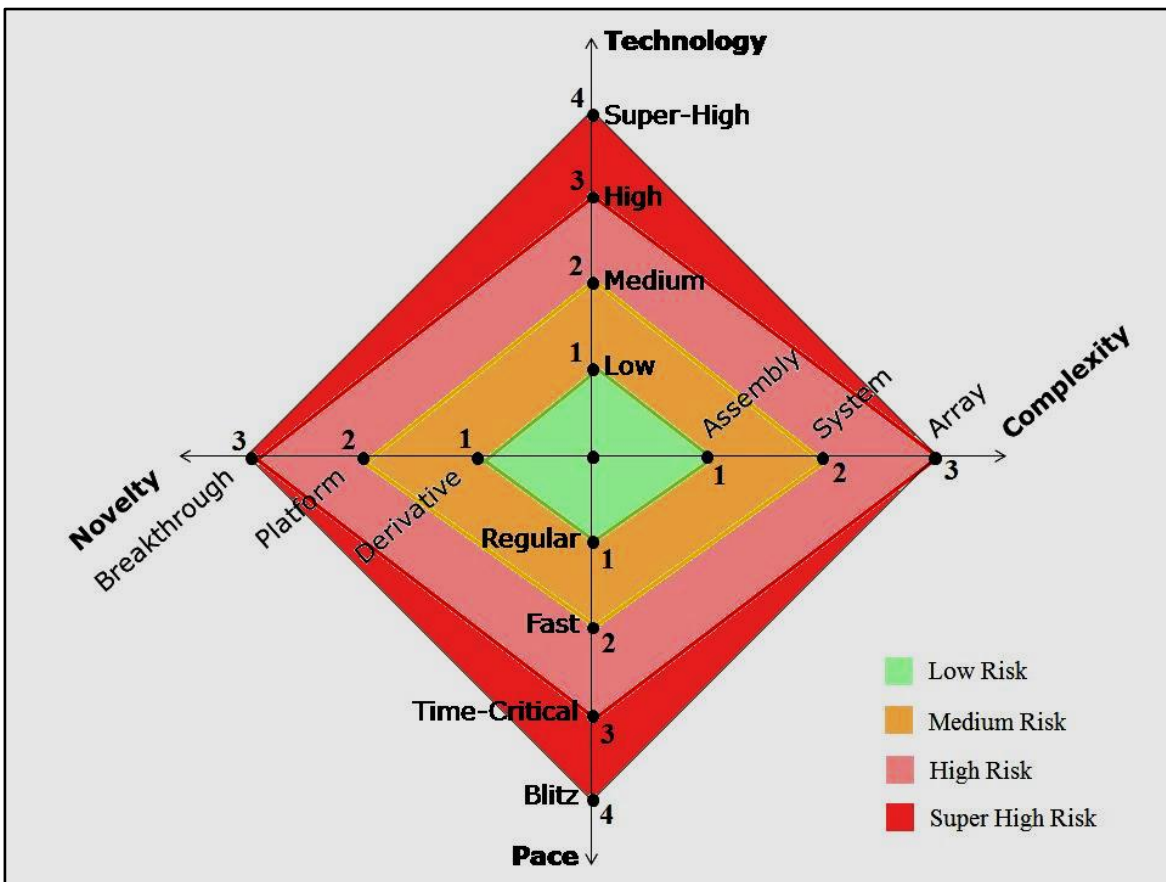
Section E of the questionnaire assessed how respondents rate project risk (See Appendix B). The data obtained were used to calculate a total risk value. The total risk value was then used to determine how and to what extent project risk moderates the relationship between project success and EP. How project risk was calculated for this research is discussed next. All projects carry a certain degree of risk, which is generally managed during the project's life cycle; however, some scholars assert that each project is different, and there is no one-size-fits-all approach to project risk. (Shenhar & Dvir, 2007:5; Van Niekerk & Steyn, 2011:125; Zonnenshain & Shabtay, 2011:28).

Furthermore, this study concurs with Shenhar and Dvir (2007:172), who argue that even though all projects involve a certain degree of risk, uncertainty and complexity, there must

be a more complete and satisfactory method to determine the level of risk concerning the project type. As previously alluded to, in the context of this research, this researcher considered the NTCP-diamond framework (Shenhar & Dvir, 2007:174) appropriate and relevant for assessing project risk.

Figure 16 illustrates that the size of the diamond in the framework indicates the risk associated with the project. Next, a summary is presented of the premise of the NTCP-diamond framework approach.

Figure 16: NTCP risk assessment



Source: Lennon (2015:5).

The larger the diamond shape, the greater the risks involved; for example, high-tech or array projects involve high risk because of technological uncertainty and complexity; likewise, breakthrough projects involve high risk because of market uncertainty (Lennon, 2015:7; Mehta, 2016:39). Project risk can be managed by understanding the degree of risk associated with each project, allowing the organisation to differentiate between projects.

Shenhar and Dvir (2007:174) developed a method for calculating risk through a simple formula. They argue that a numerical value can be assigned to quantify the levels of risk for each dimension, as depicted in Figure 16 (p. 88). By identifying a value for project risk, the researcher can determine the total risk value.

$$R = (a \times N) + (b \times T) + (c \times C) + (d \times P)$$

where:

N = Novelty,

T = Technology,

C = Complexity, and

P = Pace.

The sum of each level in the dimensions can be calculated based on the values assigned to each level; for example, the value for Novelty's 'Platform' = 2 and Technology's 'Super-high-tech' = 4. Each dimension level represents the degree of risk associated with the project. The required weights for a, b, c and d for each dimension are dependent on the specific context in which the organisation operates. It can be, for example, engineering, construction, mining, IT or production. For this study, the weighted values allocated were a = 0.2, b = 0.15, c = 0.5, and d = 0.15. Thus:

$$R = (0.2 \times N) + (0.15 \times T) + (0.5 \times C) + (0.15 \times P)$$

The value for NTCP is according to the value allocated for each dimension, as plotted on the model. The lowest value is 1 and the highest is 4, depending on how the project's risk is perceived (Shenhar & Dvir, 2007:174). The formula presented above was used to calculate the total project risk.

4.7 PROJECT RISK AS MODERATOR

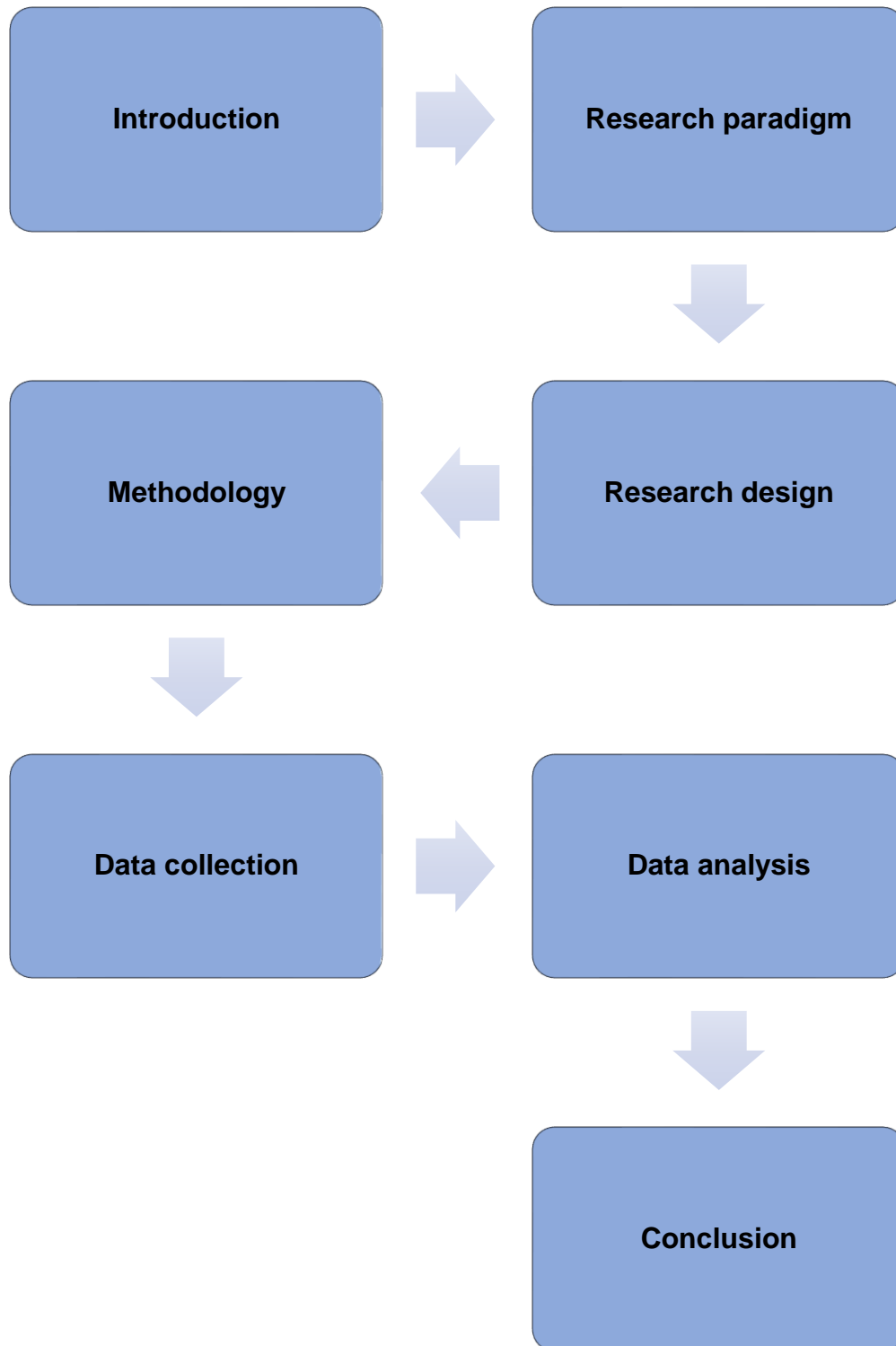
Project risk in this study was presented as a moderator. A moderator effect occurs when the relationship between the independent and dependent variables changes or is affected by the moderator variable's interaction. The strength of the relationship may change based on these changes (Matthews, Hair & Matthews, 2018:4). Often, the moderating variable is used for generalising research findings; however, the interaction between the moderator and the

independent variable should be significant to allow prediction of the dependent variable. Moreover, although a theory may be used to predict moderating effects, some moderators are exploratory, allowing them to investigate relationships between subgroups (Gómez et al., 2020:379). Based on the causal relationships between the variables depicted in the conceptual model presented in Chapter 1 (Figure 1 (p. 7)), this researcher wanted to test the hypotheses posed – specifically, how project risk moderates (interacts) the relationship between project success and EP. This study has posited that project risk influences the relationships between project success and EP (Hypothesis 2).

4.8 CONCLUSION

By investigating the relationships between project success, EP and project risk, this study has attempted to demonstrate how project risk impacts the various factors of project success and EP. The rationale is that integrating project risk into the relationship between project management and entrepreneurship can generate new knowledge, which could have theoretical and practical implications.

CHAPTER 5 RESEARCH METHODOLOGY



5.1 INTRODUCTION

The objective of the research was to investigate the relationship between project success and EP, as depicted in the conceptual model in Chapter 1 (Figure 1 (p. 7)). Subsequently, the study was divided into two sections: a literature review and an empirical analysis. The literature review (Chapters 2, 3, and 4) encapsulates the knowledge that informed the research problem. Further, this chapter guides the development of the research questions and hypotheses depicted in the conceptual model. In order to determine how well the survey data fit the conceptual framework derived from the literature, the researcher employed statistical modelling in the empirical portion of the study. This chapter describes the research methods and plan employed to carry out the empirical component of the study.

This chapter is structured as follows: The research paradigm is presented, followed by the rationale of the research methodology. The methodology section consists of the research instrument used to collect the data and explains the data analysis process and the statistical techniques used to test the hypotheses.

5.2 RESEARCH PARADIGM

A paradigm is a philosophy based on assumptions about the world, influencing how knowledge is studied and interpreted (Mackenzie & Knipe, 2006:195). This study has been constructed from a positivistic paradigm. The research approach takes an ontological view, which assumes that the world is real and measurable and exists independently of our subjective perception. (Kivunja & Kuyini, 2017:30). 'A positivistic paradigm aims to provide an objective reality against which the researcher can compare claims and establish the truth' (Mackenzie & Knipe, 2006:195). It follows that general patterns of causes and effects can be used as a foundation for forecasting and managing natural events (Kivunja & Kuyini, 2017:30).

This study aimed to discover how project success relates to an organisation's EP and the moderating effect of project risk on this relationship. To achieve this, the researcher tested the hypotheses posed in Chapter 1 that were derived from an existing body of knowledge. Objectivity in this study was achieved by following strict methodological protocols. It can therefore be assumed that the research was free of subjective bias.

5.3 RESEARCH DESIGN

Research hypotheses must be evaluated using a specific empirical strategy. Bell *et al.* (2019:45) state that research design is a framework for the collection of data and the analysis thereof. Furthermore, research design reflects the decisions and priority given to the research process and its importance. It may include:

- the causal connection between variables;
- the generalisation of research findings from a segment of the population;
- research design providing insight into the behaviour and the meaning of that behaviour in its specific social context; and
- appreciation of social phenomena and their interconnections over time.

Cooper and Schindler (2001:134) suggest that the research design should address the study's type, scope, time and purpose. Table 8 (p. 94) provides a breakdown of the research design adopted for this study.

Table 8: Justification for the chosen research design

Design consideration	Design options available	Design option chosen	Justification
The type of research	Exploratory or formal design	Formal design	Generally, formal studies build on the results of previous exploratory research to produce and contribute to scientific knowledge. This study can be classified as formal because it has built on previous research findings. Therefore, it used specific procedures to source data to answer the research questions and test the hypotheses posed in the conceptual framework.
The purpose of the study	Reporting, descriptive, causal-explanatory or causal-predictive	Causal-predictive	The variables used in a predictive model are based on association, not statistical significance. Because the purpose of this study was to develop a conceptual model to determine the relationship among the independent variable (project success), dependent variables (entrepreneurial performance) and the effect of the moderator variable (project risk) on the relationship, this study was classified as a causal-predictive study.
The time frame	Cross-sectional or longitudinal	Cross-sectional	A cross-sectional study is the collection of quantifiable data relating to several variables collected from multiple respondents at a single point in time. This cross-sectional study analysed project success, EP and the moderating effect of project risk.
	Ex post facto (after the fact) or experimental	Ex post facto	In an ex post facto design, the researcher has no control over the variables and is not required to manipulate the variables under investigation. Instead, the researcher is only required to report their findings as the objective is to investigate the relationship between the variables; thus, an ex post facto design was selected.

Source: Adapted from Oosthuizen (2018:134).

Based on the data in Table 8 (p. 94), the research methodology for this study can be characterised as a formal, ex post facto study that assessed the research, measurement and structural models developed from cross-sectional data (Oosthuizen, 2018:135).

5.4 METHODOLOGY

Sumerson (2013:57) states that methodology is research's "heart and soul". It outlines how data is collected, how sampling is conducted and how data is analysed. The researcher can also determine whether to accept or reject the hypotheses based on the methodology.

5.4.1 Research instruments

The research instruments used for this study were adapted from three validated questionnaires previously used in the literature: Entrepreneurial Performance Index (Morris & Kuratko, 2002:292–294), Project Success Assessment Questionnaire and Project Classification Questionnaire (Shenhar & Dvir, 2007:219-225), tailored to analyse the relationship between project success and EP and the moderating effect of project risk. The researcher wanted to draw the reader's attention to the following: In various studies using the Entrepreneurial Performance Index (Ireland et al., 2006a :23; Kuratko et al., 2011:379; Morris et al., 2008:327), the authors indicate that Questions 4, 6, 7 and 11 are reverse scaled. However, this researcher used a version of the questionnaire that does not indicate a reverse scale (Morris & Kuratko, 2002:292–294) and, therefore, a reverse scale was not incorporated into this study.

In designing the questionnaire, the following aspects were considered:

- A literature review informed the research objective, and the questions were based on that review.
- The language used in the document was clear, concise and devoid of unnecessary jargon.
- To keep the questions logical and easy to understand for respondents, the researcher arranged the questions logically, beginning with general questions, such as demographics.

- Throughout the survey, special attention was paid to ensure that the questions were not statements disguised as questions.

5.4.2 Types of questions

Questions presented in a questionnaire can be unstructured with open-ended responses or structured with closed-ended responses (Bell *et al.*, 2019:253). This research used a direct rating scale consisting of closed-ended questions, as quantitative research mainly incorporates closed-ended questions (Makgopa, 2019:114). The composition of the questionnaire in this way allowed for different categories of questions with diverse scales. This is in line with the quantitative analysis of the responses. The section on EP and project success incorporated a 5-point Likert scale. However, questions for the project risk assessment instrument required respondents to answer dichotomous questions, which resulted in categorical data. The following section addresses how the questionnaire was designed, elaborating on questionnaire design, types of questions and types of scales.

5.4.3 Questionnaire design

As previously mentioned, this study used questionnaires developed by Morris and Kuratko (2002:292–294) and Shenhar and Dvir (2007:219–225). The questions were formulated to minimise ambiguity as part of the study's objective. This was done with the researcher's study leader and the statistician assigned to this study to ensure that the integrity of the questionnaire remains and to consider the South African organisational culture in which it was presented. As per Appendix B, the questionnaire consisted of five sections (A to E). Table 9 lists the segments of the questionnaire.

Table 9: Questionnaire sections

Section	Description	Question number
A	Demographic information	Questions 1–7
B	Project characteristics	Questions 8–9
C	Project success assessment (5-point Likert scale)	
	Project efficiency	Questions 10–13
	Impact on customer	Questions 14–18
	Impact on the team	Questions 19–24
	Business and direct organisational success	Questions 25–30

Section	Description	Question number
	Preparing for the future	Questions 31–37
D	EP assessment (5-point Likert scale)	
	Company characteristics	Questions 38–44
	Organisation’s top-level decision-making characteristics	Questions 45–50
	New product introduction	Questions 51–53
	New service introduction	Questions 54–57
	New process introduction	Questions 58
E	Project risk assessment (dichotomous scale)	
	Novelty – Level of newness of the products/services introduced in the market	Questions 59–61
	Technology uncertainty – Design and testing, timing of design freeze and design cycles	Questions 62–65
	Complexity – The complexity of your organisation’s projects (system scope)	Questions 66–68
	Pace – How critical are your project time frames?	Questions 69–72

Source: Author’s construction.

5.4.4 Mitigating non-response bias

In non-response bias, the proportion of survey respondents who respond significantly differs from those who do not (Oosthuizen, 2018:139). In designing the questionnaire, the following factors were considered to reduce the possibility of non-response bias:

- Participants were assured that all information provided for the research was completely confidential (Refer to Appendix B: Cover letter).
- Regular follow-up emails were sent to the participants as a reminder to complete the questionnaire.
- Great care was taken to structure the questionnaire logically and to present the questions as clearly and understandably as possible.

5.4.5 Measurement quality

The measured score should reflect the actual value of the measured variable, which will indicate the quality of the measurement instrument. Measurement error, on the other hand, measures the variance between observed and accurate measurement scores (Oosthuizen, 2018:139).

However, it is important to understand that measurement error can be classified into two types: systematic errors, which occur consistently, and random errors, which are more variable due to an over or underestimation (Oosthuizen, 2018:139). Furthermore, Heale and Twycross (2015:66) state that consideration should be given to the results achieved and the rigour of the research. They explain that rigour relates to the extent to which the research was conducted through measures of validity and reliability. Measures free from random errors are referred to as reliable, which indicates how consistent the measures are in repeated testing. Validity refers to measures free from systematic and random errors, meaning that the measuring instrument measures what it ought to measure (Heal & Twycross, 2015:66).

5.4.6 Reliability

The reliability of a measure is determined by its consistency, and even though the reliability of a system cannot be calculated precisely, different measures can be used to estimate reliability. Heal and Twycross (2015:66) indicate three reliability attributes, as depicted in Table 10.

Table 10: Attributes of reliability

Attribute	Description	Type of test	Method
Internal consistency	Degree to which all the items on a scale measure one construct	Cronbach's alpha (α)	Correlation
Stability	Consistency of results with repeated testing	Test-retest	Correlation
Equivalence	Determine whether the instrument will produce similar results when multiple indicators are used to measure a construct	Through interrater reliability	Correlation

Source: Adapted from Heal and Twycross (2015:67).

Internal consistency was assessed using Cronbach's alpha (coefficient of reliability). Based on the sum of individual item variances and the variance of the sum scale, Cronbach's alpha estimates how much each item captures actual score variance. No score is determined when the coefficient is 0; only an error is reported. A coefficient of 1 is obtained if all items are reliable, which means that all items measure the same thing. It is recommended that the

coefficient be at least 0.7 or greater to be considered reliable (Heal & Twycross, 2015:67; Oosthuizen, 2018:140).

5.4.7 Validity

Validity can be defined as the degree to which a concept is measured accurately in a quantitative study. There are three significant types of validity, as depicted in Table 11.

Table 11: Attributes of validity

Type of validity	Description	Method
Content validity	Degree to which all the items on a scale measure one construct	Subjective assessment of appropriateness
Construct validity	Degree to which a research instrument measures the intended construct	Factor analysis
Criterion validity	Degree to which a research instrument is related to other instruments that measure the same variables	Correlation between the measure and criterion

Source: Adapted from Heal and Twycross (2015:66).

This study established its content validity by pre-testing the instrument before implementation to reduce possible ambiguities, biases or errors. This study pre-tested the questionnaire by presenting it to the following experts:

- an academic to provide insight into the general structure of the questionnaire,
- three project management experts to shed light on the likely effectiveness of the instrument,
- three experts familiar with the implementation of project practices in their organisations, and
- a statistics department editor to ensure the questions were presented in a logical and understandable manner.

Upon receiving feedback and comments from the pre-test panel, the researcher made improvements and adjustments to the questionnaire where applicable. This study incorporated factor analysis to determine the construct validity of the research instruments. Two-factor analysis techniques are exploratory factor analysis (EFA) and confirmatory factor analysis.

Generally, factor analysis is used for summarising data in a way that can be interpreted and understood easily. This method also isolates constructs and concepts by grouping variables into smaller clusters based on their common variance (Yong & Pearce, 2013:79). An EFA was performed to identify the latent dimensions in the study questionnaire.

5.5 DATA COLLECTION

According to Bell *et al.* (2019:14), data collection is designed to answer the research questions. Furthermore, data collection requires the researcher to define the target population and indicate how data were collected and what sampling methods were used.

5.5.1 Targeted population and sampling

Once the researcher understands what information will be required to address the research objectives specifically, a decision is taken to identify from whom the information will be obtained.

This study's target population consisted of business owners/entrepreneurs, executives, senior/top management project managers and functional managers involved in project planning and implementation. The unit of analysis for this study focused on a diverse spectrum of organisations such as engineering (mining, electrical and civil), IT, professional services, financial and business services, wholesale trade and commercial agents' services. As the target population (n) was diverse, obtaining measurements from every individual was not feasible. Therefore, it was more reasonable to obtain measurements from a representative sample of each target population (n).

In general, survey samples fall into two categories: probability and non-probability. A probability sample is a method of selecting representative samples from a population unit in a way that gives each unit an equal chance of being chosen. Sampling using this method can estimate the percentage of a population represented in a sample (Showkat & Parveen, 2017:3). In probability sampling, a target population (sample frame) is identified, a random sample frame is selected (sampling procedure), and communication is made to allow the survey to be conducted (data collection mode) (Oosthuizen, 2018:143).

Unlike a probability sampling method, a non-probability sampling method does not know from which population to select the sample (Oosthuizen, 2018:143). Surveys are often assumed to be based on probability sampling and are the preferred method to establish sound statistical reasoning about large target populations. In contrast, non-probability sampling considers the number of subgroups, a rule of thumb and budget constraints to decide on a sample size (Cooper & Schindler, 2014:349).

Punch (2014:243) asserts that recent studies in the social sciences are more open-minded towards considering non-probability sampling despite its perceived limitations, mainly due to the difficulty of accessing large or neatly constructed probability samples. In addition, non-probability sampling is more suitable when probability sampling is time-consuming and expensive. Showkat and Parveen (2017:6) state that non-probability sampling allows for the study of particular phenomena that have the potential to generate novel knowledge and insight. Based on the information presented, non-probability sampling was deemed the most appropriate method to collect data for this study. Cooper and Schindler (2014:359) and Showkat and Parveen (2017:6) identify the following techniques when implementing non-probability sampling:

- Convenience sampling obtains data from respondents who are easily accessible and willing to participate in research.
- Judgemental or purposive sampling is where the researcher selects units based on their knowledge and professional judgement.
- Quota sampling is when the researcher selects the sample based on some appropriate characteristic of the sample member.
- Snowball sampling occurs when research participants recruit other participants for a study because of the difficulty of obtaining potential participants.

This study employed an easy sampling strategy. This is because a population list cannot be supplied, data collection is expensive and a large sample size is necessary. An organisation's number of employees and turnover were considered criteria for project-oriented organisations. The reason to benchmark the number of employees and annual turnover as one of the criteria was to establish if these criteria significantly impacted whether organisations performed more or fewer projects.

5.5.2 Data collection method

This study was conducted using an electronic survey questionnaire; however, obtaining permission from project-oriented organisations to distribute the survey was a significant challenge. Therefore, primary data were collected through three methods:

- Formal requests were written to organisations focusing on project-oriented activities, requesting their permission to distribute the questionnaire.
- The researcher emailed the questionnaire to individuals involved in project and entrepreneurial processes within their organisations.
- The questionnaire was distributed to over a thousand individuals in South Africa using social media platforms.

5.5.3 Sample size

This study considered the type of analysis as a fundamental aspect when determining an accurate sample size. To evaluate the relationship between project success (independent variable), EP (dependent variable) and project risk (moderator variable), the researcher performed SEM on the data obtained. The study's sample size was determined as follows. Sample size relates to the number of respondents or observations required to ensure sufficient information is obtained to conclude the study (Kumar, Talib & Ramayah, 2013:122; Memon, Ting, Cheah, Ramayah, Chuah & Cham, 2020:4). Therefore, the researcher must consider the sample size required to ensure that the sample obtained will be large enough to perform statistical data analysis. Even though there is no absolute method for determining an appropriate sample size, the amount of precision and confidence required by the research can influence the sample size.

According to Bell et al. (2019:195), the degree of error a study allows is a vital consideration factor. While the general rule of thumb, ten participants per variable, can be considered an acceptable sample size, there is little consensus regarding the recommended sample size for SEM (Sivo, Fan, Witta & Willse, 2006:268-269). Kline (2015:16) suggests 200 as an optimal sample size, whereas Pallant (2011:18) indicates that a larger sample size is required when conducting factor analysis.

Memon *et al.* (2020:2) include factors such as the research approach, analytical method, number of variables or model complexity, time and resources, completion rate, research supervisor and method of data analysis. In addition, they highlight factors such as the complexity of the model and the inclusion of moderators, which necessitate a larger sample size. Furthermore, the sample size has been identified as one of the key factors that hamper empirical research. In their meta-analysis of 74 SEM articles, Westland (2010:476) found that 80% of all studies investigated reported an insufficient sample size (Memon *et al.*, 2020:2). Table 12 provides the following guidelines for determining the minimum sample size for a particular SEM model.

Table 12: Sample size specification for SEM

Type of model	Minimum sample size
Model containing five or fewer constructs, each with more than three (observed variables) and with higher item communalities	100
Models with seven or fewer constructs, modest commonalities and no under-identified constructs	150
Models with seven or fewer constructs, lower communalities and/or several under-identified (fewer than three items) constructs	300
Models with a larger number of constructs, some of which have fewer measured items than indicators and multiple low communalities	500

Source: Hair, Black, Babin and Anderson (2010:664).

Based on the information and guidelines presented, the sample size for this research was determined as follows. Zailani *et al.* (2016:358) suggest that, as a general rule, 'the minimum is to have at least five times as many observations as the number of variables to be analysed' (Hair *et al.*, 2010:101). Therefore, for this study, 72 questions multiplied by five gave a sample size of 360. This sample size for project-oriented organisations was considered adequate for testing the conceptual model proposed in this study (Oosthuizen, 2018:146).

5.5.4 Missing data

From the 370 responses received, only one respondent indicated that their data might not be used for academic purposes, although the questionnaire was completed and submitted. As this research adhered to strict ethical practices, respondent information was not used in this study.

5.6 DATA ANALYSIS

Through data analysis, the researcher can determine relationships between variables and examine the relationships, after which conclusions can be drawn by ordering, categorising, manipulating and summarising data (Taljaard, 2020:288).

5.6.1 Demographical profile of the respondents

Sections A and B of the questionnaire related to the demographic profile of the respondents. A demographic analysis gives insight into the characteristics of the respondents within the sample. In addition, it provides a method for interpreting and generalising the results (Makgopa, 2019:187; Oosthuizen, 2018:170).

5.6.2 Factor analysis

Factor analysis can be categorised into two approaches: EFA and confirmatory factor analysis. In both methods, items are examined in relation to the theoretical constructs or factors they represent. Additionally, the factors underlying measurement scales are usually determined using EFA and confirmatory factor analysis techniques (Shrestha, 2021:4). For this research, EFA was used to determine the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity as a measure of data quality. In addition, EFA establishes eigenvalues, which are the 'true' values of the various factors Shrestha, 2021:4).

5.6.3 Descriptive analysis

Descriptive statistics present data concisely and understandably, giving the researcher a general overview (Kaushik & Mathur, 2014:1188). Descriptive statistics can provide insight into the nature of the responses and illustrate the variables' differences. Standard deviation, means and frequency were used to describe the results of this study. The information is presented in tabular format and interpreted in Chapter 6.

5.6.4 Structural equation modelling

As the main objective of this study was to investigate the relationship between project success and EP, and test the moderating effect of project risk on this relationship (which is exploratory), partial least squares structural equation modelling (PLS-SEM) was deemed most appropriate for this study (Zailani *et al.*, 2016:359). The PLS-SEM model and its ability to explain the target constructs are evaluated by estimating the strength of the relationships between latent variables. As a result of its capability to estimate very complex models and moderate data requirements, PLS-SEM has grown in popularity. The PLS-SEM technique SmartPLS (version 4.0) was used to test the structural model. Hair, Matthews, Matthews and Sarstedt (2017:118) consider this technique appropriate when analysing complicated models.

5.6.5 Goodness of fit

This indicates how well the data fit the predefined model. Regarding the statistical model used, goodness-of-fit indices summarise the differences between the observed and expected variables (Oosthuizen, 2018:158). Although there are several goodness-of-fit statistical parameters available, this study incorporated the squared Euclidean distance, standardised root mean square residual, geodesic distance and normed fit index.

5.6.6 Construct validity of the measurement model

The measurement model expresses the relationships between the latent variable construct(s) and its associated indicator variable(s) (Hair *et al.*, 2017:110). For assessing the reliability and validity of the measurement model, the following measures were used (Min, Iqbal, Khan, Akhtar, Anwar & Qalati, 2020:8):

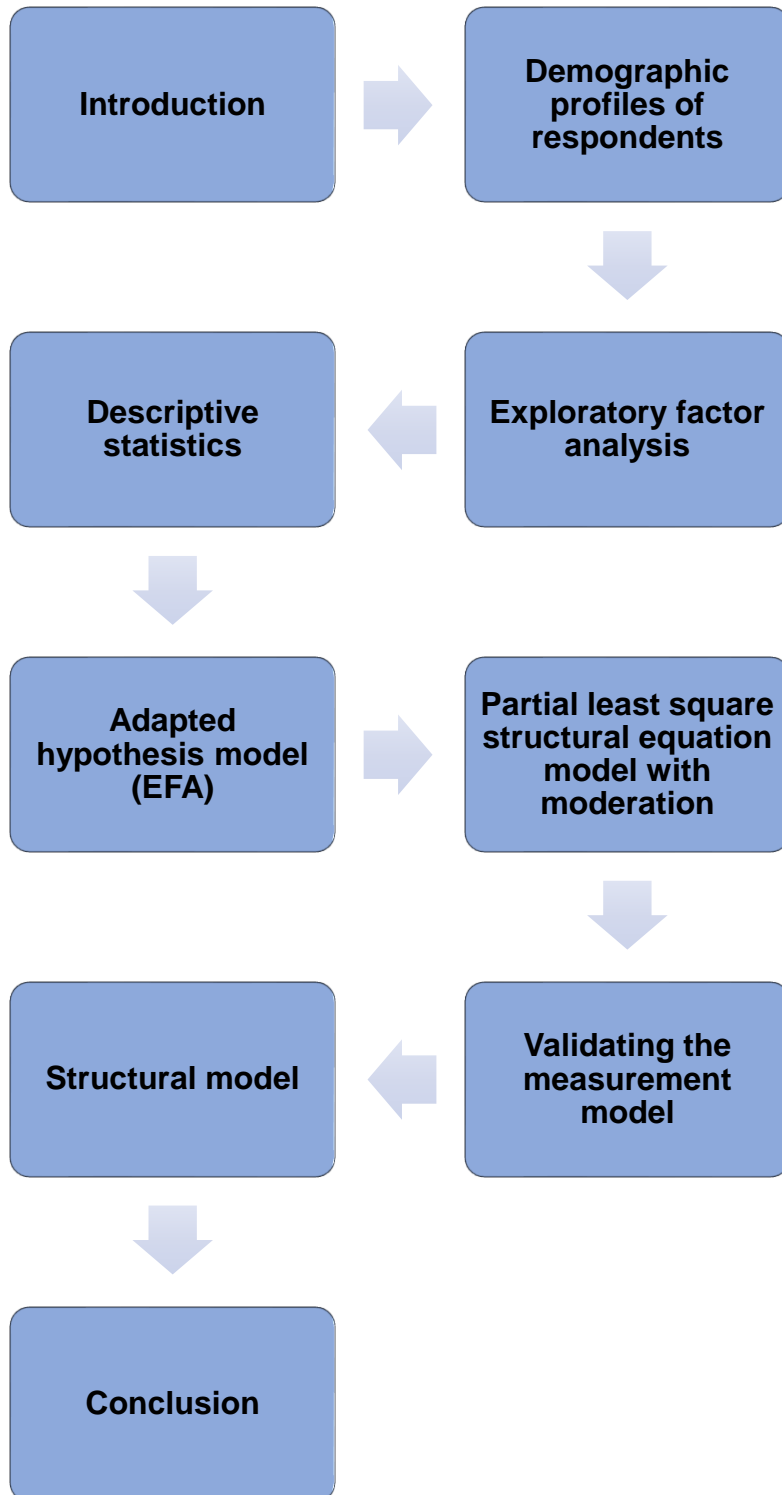
- Individual item reliability (loadings): Results for the outer loadings will indicate whether it meets the criteria for individual item reliability.
- Composite reliability: Composite reliability is a measure of internal consistency, and whether it meets the criteria will confirm the reliability of the measurement model.

- Convergent validity (average variance extracted [AVE]): can be established if the AVE is lower than 0.5, but composite reliability is >0.6 . In addition, If the square root for each AVE is >0.5 , discriminant validity can be established.
- Cronbach's alpha: Generally, an accepted value for Cronbach's alpha is 0.6 to 0.7, which indicates an acceptable level of reliability, and a value of 0.8 or greater indicates a very significant level of reliability.
- Discriminant validity: An essential aspect of discriminant validity is the degree to which factors are distinct and uncorrelated; typically, variables should be more strongly correlated with their factor than with another.

5.7 CONCLUSION

This chapter presented an outline of the methodology used in this research. An explanation of why the research was conducted from a positivist paradigm was provided. This was followed by an explanation of why the research design was selected. The hypotheses were tested using various statistical methods, including descriptive statistics, factor analysis and SEM. These methods, based on the actual data obtained, are presented in Chapter 6.

CHAPTER 6 DATA ANALYSIS



6.1 INTRODUCTION

As a follow-up to Chapter 1's objectives and questions, this chapter interprets the data obtained from the survey, allowing the researcher to accept or reject the hypotheses based on the interpretation of the findings. The analysis of the data in this chapter is presented in five main sections: demographic profiles of respondents, exploratory factor analysis, which addresses the research model presented in Chapter 1; descriptive statistics of the factors; adapted hypothesis model; PLS -SEM with moderation; validating the measurement model and interpreting the result for the structural model. The figures and tables presented in this chapter are based on the information obtained from the survey data and are the researcher's anthology.

6.2 DEMOGRAPHIC PROFILES OF RESPONDENTS

Understanding the demographic profile of the sample is vital before analysing the data empirically since it provides the context for the findings. The demographic analysis gives insight into the characteristics of the sample and provides a method for interpreting the results and generalising them. Section A of the questionnaire (Appendix B) relates to the demographic profile of the respondents, the results of which are presented next.

6.2.1 Gender

Table 13 indicates that the gender profile of respondents was unequally divided: 25.5% (n = 93) female and 74.5% (n = 275) male respondents. Only 0.3% (n = 1) of the respondents did not want to indicate their gender.

Table 13: Gender of the respondents

		Frequency	Percentage (%)	Valid %	Cumulative %
Criteria	Female	93	25.2	25.2	25.2
	Male	275	74.5	74.5	99.7
	Prefer not to say	1	0.3	0.3	100.0
	Total	369	100.0	100.0	

Source: Author's compilation.

6.2.2 In what capacity do the respondents answer the questions?

The researcher wanted to determine in what capacity the respondents answered the questionnaire. Table 14 identifies five different organisational capacities, of which the highest score was obtained from business owner/entrepreneur 28.5% (n = 105), while the lowest score was from executive management 11.1% (n = 41).

Table 14: Capacity of the respondents

		Frequency	Percentage	Valid %	Cumulative %
Criteria	Business owner/entrepreneur	105	28.5	28.5	28.5
	Executive management	41	11.1	11.1	39.6
	Functional manager	51	13.8	13.8	53.4
	Project manager	94	25.5	25.5	78.9
	Senior/Top management	78	21.1	21.1	100.0
	Total	369	100.0	100.0	

Source: Author's compilation.

6.2.3 Years of experience

Table 15 presents respondents' years of work experience in project-oriented organisations. Most respondents had less than five years' experience in their current job capacity (n = 101), which equates to 27.4%. The minority of respondents (n = 36), equating to 9.8%, had 15 to 20 years of work experience. It is followed by respondents with five to 10 years of work experience (26.8%), then respondents with more than 20 years of work experience (19.5%) and those with 10 to 15 years of work experience (16.5%).

Table 15: Years of experience

		Frequency	Percentage	Valid %	Cumulative %
Criteria	Less than 5 years	101	27.4	27.4	80.5
	Between 5 and 10 years	99	26.8	26.8	53.1
	Between 10 and 15 years	61	16.5	16.5	16.5
	Between 15 and 20 years	36	9.8	9.8	26.3
	More than 20 years	72	19.5	19.5	100.0
	Total	369	100.0	100.0	

Source: Author's compilation.

6.2.4 Rand value of the projects worked on

Table 16 presents the results regarding the rand value of the projects respondents worked on in the past three years. The majority of the respondents' (n = 113) project values were more than R100 million (30.6%), while the value of (n = 109) respondents' projects was less than R10 million (29.5%). This value difference is significant. The following range of respondents (n = 100) indicated that their project value ranged between R10 million and R50 million (27.1%). The lowest response frequency (n = 47) indicated that the value was between R50 million and R100 million (12.7%).

Table 16: Rand value of the projects

		Frequency	Percentage	Valid %	Cumulative %
Criteria	Less than R10 million	109	29.5	29.5	69.4
	From R10 million to R50 million	100	27.1	27.1	27.1
	From R50 million to R100 million	47	12.7	12.7	39.8
	More than R100 million	113	30.6	30.6	100.0
	Total	369	100.0	100.0	

Source: Author's compilation.

6.2.5 Type of industry in which respondents operate

Table 17 indicates that the majority of the respondents included in the sample operated in engineering (mining, electrical and civil) organisations (38.2%; n = 141), finance and professional services (19.8%; n = 73), IT (23.0%; n = 85), innovation projects (9.5%; n = 35), and new project development (9.5%; n = 9.5).

Table 17: Type of industry

		Frequency	Percentage	Valid %	Cumulative %
Criteria	Engineering (mining, electrical, civil)	141	38.2	38.2	38.2
	Finance and professional services	73	19.8	19.8	58.0
	IT	85	23.0	23.0	81.0
	Innovation projects	35	9.5	9.5	90.5
	New product development	35	9.5	9.5	100.0
	Total	369	100.0	100.0	

Source: Author's compilation.

6.2.6 Number of employees

Table 18 indicates that 45.5% (n = 168) of the respondents operated in large enterprises (more than 200 employees), 26.3% (n = 97) operated in medium enterprises (20 to 200 employees), 14.6% (n = 54) operated in very small businesses (six to 20 employees), and 13.6% (n = 50) operated in micro enterprises (fewer than five employees).

Table 18: Number of employees

		Frequency	Percentage	Valid %	Cumulative %
Criteria	A micro-enterprise (fewer than 5 employees)	50	13.6	13.6	59.1
	A very small business (6 to 20 employees)	54	14.6	14.6	73.7
	Medium enterprise (20 to 200 employees)	97	26.3	26.3	100.0
	A large enterprise (more than 200 employees)	168	45.5	45.5	45.5
	Total	369	100.0	100.0	

Source: Author's compilation.

6.2.7 Organisational growth life cycle phase

Table 19 reports that 50.7% (n = 187) of respondents indicated that their organisational life cycle phase was mature, 38.2% (n = 141) indicated that it was growing, 6.8% (n = 25) indicated that it was start-up, and 4.3% (n = 16) indicated that it was declining.

Table 19: Growth life cycle phase

		Frequency	Percentage	Valid %	Cumulative %
Criteria	Declining	16	4.3	4.3	4.3
	Growing	141	38.2	38.2	42.5
	Mature	187	50.7	50.7	93.2
	Start-up	25	6.8	6.8	100.0
	Total	369	100.0	100.0	

Source: Author's compilation.

6.2.8 Primary project customer

From the information in Table 20, it can be seen that 78.6% of the respondents (n = 290) indicated that their primary project customer was external to the organisation they operate in, while 21.4% (n = 79) indicated that their primary customers were internal.

Table 20: Primary project customer

		Frequency	Percentage	Valid %	Cumulative %
Criteria	External customer	290	78.6	78.6	78.6
	Internal customer	79	21.4	21.4	100.0
	Total	369	100.0	100.0	

Source: Author's compilation.

6.2.9 Primary project objectives

In Table 21, 43.4% (n = 160) of the respondents indicated that their primary project objective was to improve and upgrade existing products/services, whereas 24.4% (n = 90) responded that their primary project objective was to obtain strategic positioning in the market. Of the respondents, 20.3% (n = 75) stated that their primary project objective was to acquire or develop new technology, and 8.1% (n = 30) had their primary project objectives as routine or maintenance-oriented. Finally, 3.8% (n = 14) consider research and development as their primary research objective.

Table 21: Primary project objectives

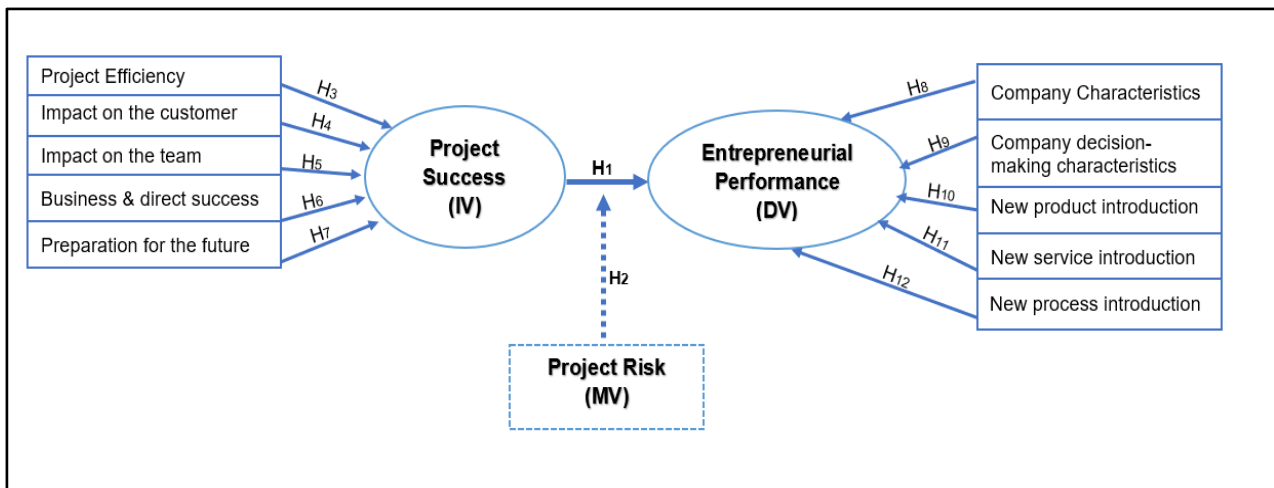
		Frequency	Percentage	Valid %	Cumulative %
Criteria	The extension (improving, upgrading existing products/services)	160	43.4	43.4	43.4
	Maintenance (routine)	30	8.1	8.1	51.5
	Problem-solving (acquire or develop new technology/new capability)	75	20.3	20.3	71.8
	Research and development	14	3.8	3.8	75.6
	Strategic (primary objective is to obtain strategic positioning in the markets)	90	24.4	24.4	100.0
	Total	369	100.0	100.0	

Source: Author's compilation.

6.3 EXPLORATORY FACTOR ANALYSIS

In factor analysis, a set of variables is analysed to determine whether they form logical subsets that are relatively independent. Factor analysis is beneficial in identifying underlying attributes that can be bundled into one factor (Shrestha, 2021:4). Factor analysis can be categorised into two approaches: EFA and confirmatory factor analysis. This section first reports on how EFA was applied in this research. The reason for incorporating EFA in this study was to identify the factorial structure of the measures and examine their internal reliability. In Chapter 1, this study presented a hypotheses model from which the research questions and hypotheses were derived (Figure 17) and is elaborated on throughout Chapter 5, which consists of several sections that provide the foundation on which the data analysis is derived from.

Figure 17: Hypotheses model



Source: Author's compilation.

The responses to the questionnaire yielded 26 640 datasets (72 questions times the number of responses (370)). As the title suggests, EFA allows the researcher to develop a theory by exploring a large dataset based on a research model. Furthermore, EFA can also be considered an umbrella term that refers to statistical methods used to identify underlying factors within a large dataset and then reduce them into smaller subsets (Pérez & Medrano, 2014:71).

Hence, EFA can identify causal characteristics between measured factors and latent constructs, which can prove the validity of these constructs.

Also, EFA is appropriate for scale development and can be applied when a theoretical basis needs to be improved for predicting the number and patterns of common factors (Taljaard, 2020:267). The number of factors and rotational schemes for this study were significantly influenced by pragmatic rather than theoretical reasoning. As mentioned, an EFA is used to diagnose the data, giving the researcher information regarding several factors that best represent the data. In any factor analysis, the factors can only be named after the analysis. This means there is no way to know how many factors exist or which variables belong to which factors (Taljaard, 2020:267).

To check the linearity of the constructs for this research, the EFA conducted included the following: KMO and Bartlett's test, eigenvalues, pattern matrix, and reliability and validity for EP and project success.

6.3.1 Exploratory factor analysis – entrepreneurial performance

6.3.1.1 *Kaiser-Meyer-Olkin and Bartlett's test of sphericity – entrepreneurial performance*

The factor analysis of the data focused on two classifications: KMO as a measure of sample adequacy and Bartlett's test as a measure of data quality (Shrestha, 2021:6). The KMO index ranges from 0 to 1, and a minimum value between 0.8 and 1.0 is considered adequate. In contrast, 0.7 to 0.79 and 0.6 to 0.69 are considered middle and mediocre, respectively. Bartlett's test should be significant ($p < 0.05$) for the factor analysis to be deemed appropriate (Shrestha, 2021:6). Retaining factors with eigenvalues greater than 1 is the goal of factor analysis. A positive eigenvalue indicates that the factor explains a common rather than a unique variance. This is a reasonable standard in statistics because a positive eigenvalue indicates a significant factor (Shrestha, 2021:7).

For EP, three rounds of factor analysis were completed. The KMO for the third round of analysis was recalculated at a level of 0.890 (as per Table 22 (p. 115)). A value of > 0.05 indicates a correlation between pairs of items and that a factor analysis is therefore warranted. Bartlett's test determines whether there is a correlation between the items.

Table 22: KMO and Bartlett’s test – EP (Round 3)

KMO measure of sampling adequacy and Bartlett's test of sphericity		
KMO measure of sampling adequacy		0.890
Bartlett's test of sphericity	Approx. chi-square	3164.936
	Degrees of freedom	190
	Sig.	0.000

Source: Author’s compilation.

6.3.1.2 Eigenvalues – entrepreneurial performance

The prefix *eigen* is a German word which can be interpreted as 'true'; therefore, the eigenvalue is the actual value of the various factors. Eigenvalues represent the total variance that can be explained by a given factor, which can be positive or negative but is generally favourable. If all eigenvalues are > 0, then the factor is positive (Shrestha, 2021:7). From Table 23, one may observe three initial eigenvalues greater than 1. These values explain 51.66% of the variance. This is regarded as acceptable for this analysis.

Table 23: Total variance explained – EP (Round 3)

Total variance explained							
Factor	Initial eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total
1	7.096	35.481	35.481	6.596	32.979	32.979	5.923
2	1.906	9.529	45.010	1.386	6.929	39.908	4.702
3	1.330	6.650	51.660	.748	3.738	43.647	1.675

Source: Author’s compilation.

Extraction method: principal axis factoring; when factors are correlated, sums of squared loadings cannot be added to obtain the total variance.

6.3.1.3 Pattern matrix – entrepreneurial performance

The pattern matrix represents the loadings, where each row is a regression equation, and the standardised observed variable is expressed as a function of the factors.

Table 24 indicates the pattern factor matrix for the third round of factor analysis. This was done after all three factors were extracted, with all factors indicating a factor loading > 0.3.

Table 24: Pattern matrix – EP (Round 3)

Pattern matrix			
	Factor		
	1	2	3
How significantly did your organisation introduce new services during the past three years?	0.931		
How significant were your organisation's revisions or improvements to existing services implemented during the past three years?	0.846		
How significantly did your organisation introduce new services compared with your competitors?	0.800		
How significantly did your organisation introduce new methods or processes during the past three years?	0.757		
How significantly did your organisation introduce new products compared with your major competitors?	0.648		
To what extent did new services include services that did not previously exist in your markets (new to the market)?	0.621		
How significant were product improvements or revisions introduced by your organisation during the past three years?	0.619		
Continuous improvement in methods of production and/or service delivery.	0.452		
Introduced a high rate of new products/services compared to competitors (including new features and improvements).	0.409		
Actively searching for big opportunities.		0.702	
Large, bold decisions, despite uncertainties of the outcomes.		0.681	
Seeking unusual, novel solutions by senior executives to address problems.		0.579	
Risk-taking by key executives in seizing and exploring growth opportunities.		0.566	
Rapid growth is the dominant goal.		0.552	
Compromising among the conflicting demands of owners, government, management, customers, employees and suppliers.		0.424	
Charismatic leader at the top.		0.412	
Cautious, pragmatic, step-at-a-time adjustments to problems.			0.772
Steady growth and stability as the primary concerns.			0.374
Top management's emphasis is on avoiding new product development costs.			0.340

Source: Author's compilation.

Extraction method: principal axis factoring. Rotation method: Oblimin with Kaiser normalisation. Rotation converges in seven iterations. The pattern matrix, as depicted in

Table 24 (p. 115), identifies three factors for EP. From this information, the following factors were renamed: Factor 1: Improved EP, Factor 2: Company characteristics and Factor 3: Management attitude.

6.3.1.4 Reliability and validity of the instrument

At the heart of instruments' reliability and validity is whether the methods used to obtain the data will yield the same results when applied at different times. An instrument's reliability can be determined by its ability to accurately measure the same construct repeatedly under similar conditions. A valid instrument measures the intended construct, and reliability is required for validity. Thus, to guarantee reliability, Cronbach's alpha is used to measure how closely related a set of items are as a group and indicate whether the items measure the same construct (Heal & Twycross, 2015:67; Kapepa, 2017:241; Oosthuizen, 2018:140). Cronbach's alpha values can be interpreted as follows:

Cronbach's alpha (α)-value	Internal consistency
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor

Table 25 depicts all the factors loaded for EP. Factors 1 and 2 yielded a Cronbach's alpha of 0.891 and 0.802, respectively, indicating a good level of internal consistency of the data, which implies that the alpha would not increase if any of the items were to be deleted. Factor 3 produced a Cronbach's alpha of 0.484, indicating a lower level of internal consistency.

Table 25: Cronbach's alpha – three factors

Reliability statistics		
Factor	Cronbach's alpha	Number of items
Improved EP	0.891	8
Company characteristics	0.802	7
Management attitude	0.484	3

Source: Author's compilation.

The following section reports on KMO and Bartlett's test, initial eigenvalues, pattern matrix, and the reliability and validity of the instrument for project success.

6.3.2 Exploratory factor analysis – project success

6.3.3.1 *Kaiser-Meyer-Olkin and Bartlett's test of sphericity – project success*

For project success, two rounds of factor analysis were completed. The KMO for the second round of analysis was recalculated at a level of 0.952 (as per Table 26). The p -value is < 0.05 ; therefore, the null hypothesis that there is no correlation between the questions/items was rejected.

Table 26: KMO and Bartlett's test – project success (Round 2)

KMO measure of sampling adequacy and Bartlett's test of sphericity		
KMO measure of sampling adequacy		0.952
Bartlett's test of sphericity	Approx. chi-square	7705.091
	Degrees of freedom	351
	Sig.	0.000

Source: Author's compilation.

6.3.3.2 *Eigenvalues – project success*

From Table 27, one may observe four eigenvalues greater than 1. These values explain 67.56% of the variance. This was regarded as acceptable for this analysis.

Table 27: Total variance explained – project success (Round 2)

Total variance explained							
Factor	Initial eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total
1	13.426	49.727	49.727	13.073	48.418	48.418	10.642
2	1.937	7.174	56.901	1.493	5.528	53.946	6.353
3	1.600	5.926	62.827	1.292	4.787	58.733	10.017
4	1.279	4.735	67.563	0.946	3.502	62.235	8.288

Source: Author's compilation.

Extraction method: principal axis factoring; when factors are correlated, sums of squared loadings cannot be added to obtain the total variance.

6.3.3.3 Pattern matrix – project success

Table 28 indicates the pattern factor matrix for the second round of factor analysis from which four factors were extracted. Rotation converged in eight iterations, below the accepted level of 0.6 in the EFA test.

In the context of factor analysis, this implies that the loadings of these factors must be reconsidered regarding whether they should be removed or retained. This is in order to carry out further studies related to this study.

Table 28: Pattern matrix – project success (Round 2)

Pattern matrix				
	Factor			
	1	2	3	4
The project met the customer's requirements.	0.919			
The customer was satisfied.	0.769			
The customer is using the project's product/or service.	0.713			
The project improved the customer's performance.	0.684			
The customer will approach us again for future work.	0.637			
Overall, the project was a great success.	0.528			
Other efficiency measures were achieved.	0.519			
The project was completed within or below budget.	0.506			
The project was completed on time or earlier.	0.471			
The project contributed to new business processes.		0.760		
The project created new technology for future use.		0.735		
The project will help create new markets.		0.690		
The project will lead to additional new products.		0.597		
The project developed better managerial capabilities.		0.422		
The project outcome will contribute to future projects.	0.309	0.412		
The project contributed to shareholders' value.			-0.943	
The project has a positive return on investment.			-0.838	
The project increased the organisation's profitability.			-0.817	
The project increased the organisation's market share.			-0.762	
The project contributed to the organisation's direct performance.			-0.667	

Pattern matrix				
	Factor			
	1	2	3	4
The project was an economic success.			-0.650	
The team had high morale and energy.				0.856
The team felt that working on this project was fun.				0.788
The team was highly loyal to the project.				0.617
The team was highly satisfied and motivated.				0.590
Team members wanted to stay in the organisation.			-0.303	0.448
Team members experienced personal growth.				0.311

Source: Author's compilation.

Extraction method: principal axis factoring. Rotation method: Oblimin with Kaiser normalisation. Rotation converges in eight iterations. The pattern matrix, as depicted in Table 28 (p. 117), identified four factors for project success. From this information, the factors were renamed: Factor 1: Customer perception, Factor 2: Project characteristics, Factor 3: Project performance and Factor 4: Project team.

6.3.3.4 Reliability and validity of the instrument – project success

Table 29 (p. 120) depicts the factors loaded for project success. All factors yielded a Cronbach's alpha > 0.8, indicating a good level of internal consistency of the data, which implies that the alpha would not increase if any of the items were to be deleted. This suggests that all statements about customer perception, project characteristics, project performance and project team could measure project success to such an extent that it could be considered a reliable instrument.

Table 29: Cronbach's alpha – four factors

Reliability statistics		
Four	Cronbach's alpha	Number of items
Customer perception	0.926	9
Project characteristics	0.832	5
Project performance	0.913	6
Project team	0.899	6

Source: Author's compilation.

6.4 DESCRIPTIVE STATISTICS

Statistics aims to define, organise, analyse and interpret information for description and decision-making. These descriptive statistics provide a numerical summary of the data by presenting data in a concise and easily understandable way (Kaushik & Mathur, 2014:1188). The following section briefly describes the descriptive statistics used. An essential aspect of the mean is that it includes every value in a particular data set. This is because the mean represents the centre of the observed samples. A standard deviation with a high value is representative of a broader spread in the data. Skewness can be negative or positive and indicates a non-symmetrical pattern of the data, as opposed to when the value is zero, which means the data are more symmetrical (Min *et al.*, 2020:11) The data for this research was left-skewed. Kurtosis shows the difference between a normal distribution's tails and peaks. A zero value for kurtosis represents a perfectly normal distribution of the data. The data for this study had positive kurtosis values, which means the distribution had a sharper peak and heavier tails compared to a normal distribution (Min *et al.*, 2020:11). The descriptive statistics for EP and project success are presented in Table 30 and Table 31 (p. 122), respectively.

Table 30: Descriptive statistics for EP

	N	Minimum	Maximum	Mean	Std. deviation	Skewness	Kurtosis
Improved entrepreneurial action	369	1.00	5.00	3.6998	0.74236	-0.773	0.872
Company characteristics	369	1.00	5.00	3.6520	0.68878	-0.754	1.054
Valid N (listwise)	369						

Source: Author's compilation.

Table 31: Descriptive statistics for project success

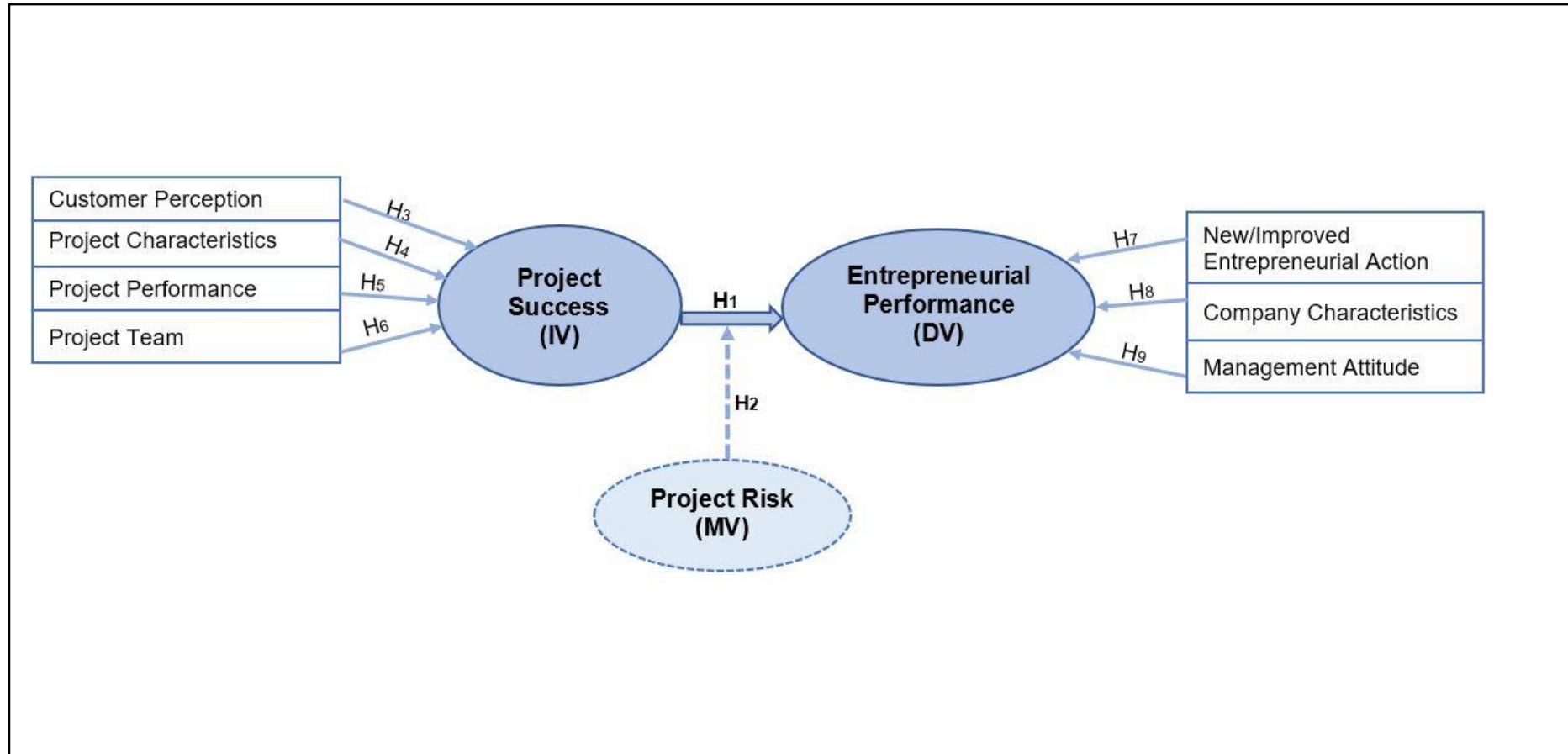
	N	Minimum	Maximum	Mean	Std. deviation	Skewness	Kurtosis
Customer perception	369	1.00	5.00	4.1105	0.72856	-1.668	4.082
Project characteristics	369	1.00	5.00	3.8997	0.74369	-0.750	1.009
Project performance	369	1.00	5.00	3.9973	0.78183	-1.297	2.542
Project team	369	1.00	5.00	3.9995	0.72237	-1.236	2.703
Valid N (listwise)	369						

Source: Author's compilation.

6.5 ADAPTED HYPOTHESIS MODEL (EFA)

The evidence gathered during the literature review was used to develop a hypothesised model, presented in Chapter 1. However, updating this model based on the information derived from the EFA was necessary, and the adapted EFA model is illustrated in Figure 18 (p. 123).

Figure 18: Adapted EFA model



Source: Author's compilation.

Results from the EFA confirmed three constructs: project success (independent variable), EP (dependent variable) and project risk (moderator variable). Furthermore, the model depicts the outline of the hypothesised relationship between the latent variables measured in the research. According to Table 32, this study tested and drew conclusions about the hypotheses based on SEM, and updated the findings through SEM.

Table 32: Adapted hypotheses tested through SEM

Adapted hypotheses	
H1	There is a significant positive relationship between project success and EP.
H2	Project risk does not have a moderating effect on the relationship between project success and EP.
H3–H6	There is a positive relationship between the formative power of customer perception, project characteristics, project performance, the project team and project success (independent variable).
H7–H10	There is a positive relationship between the formative power of improved entrepreneurial action, company characteristics, management attitude and EP (discriminant validity).

Source: Author's compilation.

It should be noted that Factor 3: Management attitude (Section 6.3.1.4) and Hypothesis 9 produced a Cronbach's alpha of 0.484, indicating a lower level of internal consistency; therefore, this factor was not used further in calculating the statistics in this research.

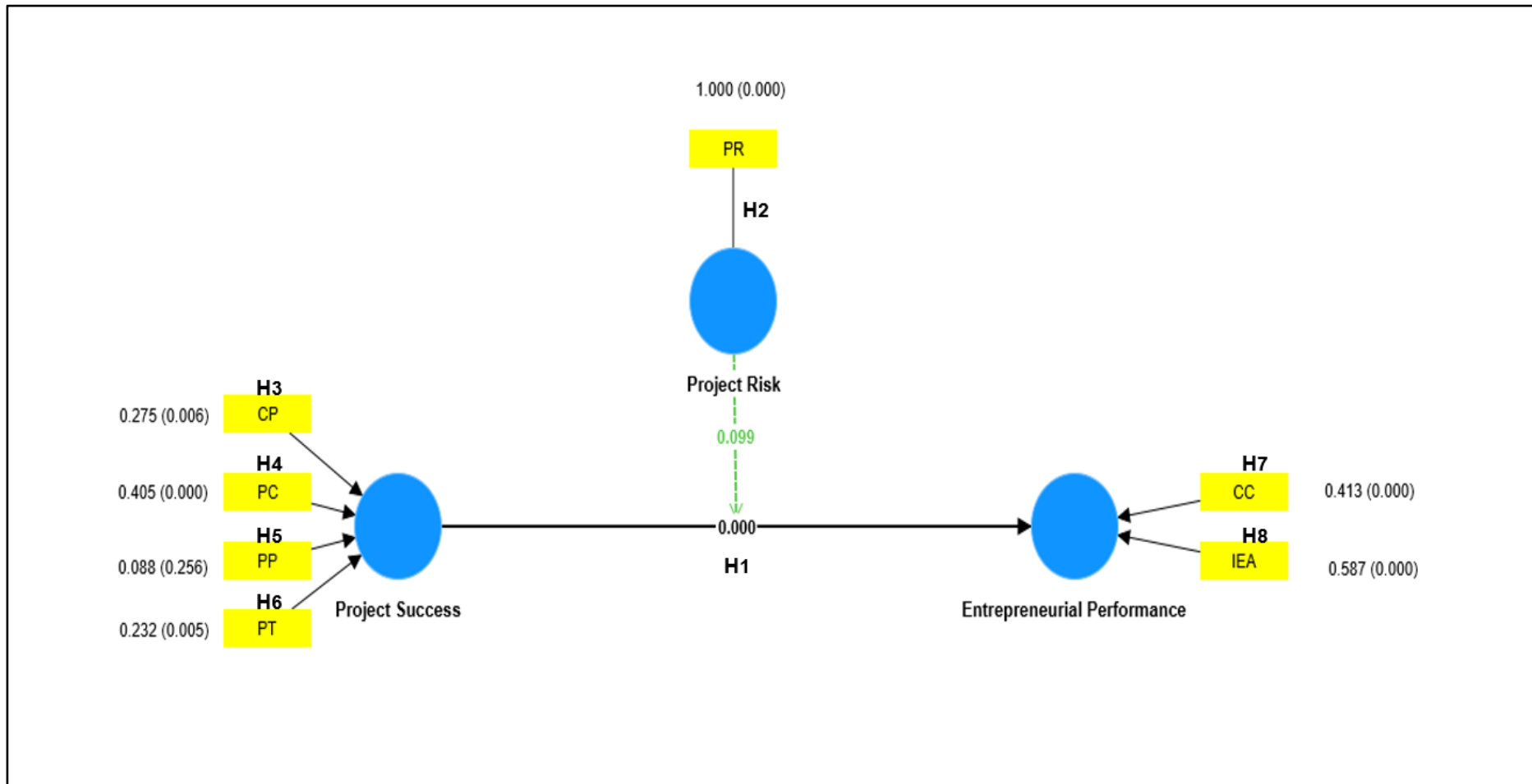
6.6 PARTIAL LEAST SQUARE-STRUCTURAL EQUATION MODEL WITH MODERATION

'The desire to test complete theories and concepts is one of the major reasons authors conduct business research' (Hair, Ringle & Sarstedt, 2011:139). SEM can analyse complex relationships among constructs and indicators. Structural equation models are generally estimated using covariance-based SEM and PLS SEM. Compared with covariance-based SEM, PLS-SEM represents an approach to SEM that emphasises prediction in building models whose structures can provide causal explanations. PLS-SEM is also helpful for confirming measurement models.

This study used the PLS-SEM technique SmartPLS (version 4.0). Hair *et al.* (2017:118) consider this technique appropriate when analysing complicated models.

As the main objective of this study was to investigate the relationship between project success and EP and test the moderating effect of project risk on this relationship (which is exploratory), PLS-SEM was deemed most appropriate for this study (Zailani *et al.*, 2016:359). In SEM, a measurement model and a structural path model can be assessed simultaneously by combining two robust statistical analyses: EFA and structural path analysis (Hair *et al.*, 2017:109; Lee, Petter, Fayard & Robinson, 2011:306). A causal modelling approach such as PLS-SEM can provide the researcher with a more comprehensive explanation of the variance of the constructs. When using PLS for data analysis, it is crucial to understand thoroughly how the measurements and structural models are estimated (Lee *et al.*, 2011:309). The path modelling process is termed *partial* because 'the iterative PLS-SEM algorithm estimates the coefficients for the partial ordinary least squares regression models in the measurement models and the structural model' (Hair *et al.*, 2011:141). As illustrated in Figure 19 (p. 126), the statistical SEM model consists of two elements. An inner model (structural model) depicts the structural paths between the constructs, and the outer model (measurement model) indicates the relationships between each latent variable construct and the associated indicator variables (Hair *et al.*, 2017:110). For this research, PLS-SEM followed a two-stage approach. The first stage reported on the data obtained for the measured model, and the second stage presented the data results for the structural model. In addition, the results indicate the moderating effect of project risk on project success and EP.

Figure 19: A revised conceptual model



Source: Author's compilation.

6.7 VALIDATING THE MEASUREMENT MODEL

6.7.1 Validity

An instrument is valid when it measures what it is supposed to measure (Shrestha, 2021:5). The measurement model must demonstrate three types of validity in order to be considered valid:

- **Construct validity:** For formative measured constructs, validating the measurement model includes convergent and discriminant validity (Shrestha, 2021:5). As Section 5.4.7 indicates, content validity was established by pre-testing the instrument before it was distributed to respondents. In Section 6.3, construct validity was established through EFA (Shrestha, 2021:7).
- **Convergent validity (AVE):** As a general rule, convergence is deemed adequate when the AVE is greater than 0.50. As seen in Table 6.20, all the AVE values were below the 0.50 recommended threshold required for AVE. Convergent validity is confirmed if AVE is lower than 0.5 but composite reliability is > 0.6 . In addition, if the square root for each AVE is > 0.5 , discriminant validity can be established (Mirzaei, Dehdari, Taghdisi & Zare, 2019:905).
- **Discriminant validity:** According to Hair *et al.* (2017:111), discriminant validity is when a construct is empirically unique compared to another construct in a measurement model. Thus, in discriminant validity, each construct captures a unique phenomenon not represented by any other construct. Simply put, it is the degree to which one construct is genuinely different from another (Oosthuizen, 2018:231). Correlation < 0.85 indicates that discriminant validity potential exists between the scales, while results > 0.85 suggest that the constructs overlap and most likely are measuring the same thing (Carter, 2016:733). 33 presents the combined discriminant validity for EP and project success.

Table 33: Summary of discriminant validity

	IEA	CC	CP	PC	PP	PT
Improved entrepreneurial action (IEA)	0.942					
Company characteristics (CC)	0.505**	0.874				
Customer perception (CP)	0.464**	0.427**	0.930			

	IEA	CC	CP	PC	PP	PT
Project characteristics (PC)	0.453**	0.441**	0.456**	0.884		
Project performance (PP)	0.436**	0.428**	0.695**	0.499**	0.951	
Project team (PT)	0.416**	0.398**	0.634**	0.419**	0.599**	0.885

Source: Author's compilation.

** Correlation is significant at the 0.01 level (2-tailed).

Values on the diagonal (bold) are the square root of the AVE, while the off-diagonals are correlation coefficients.

6.7.2 Reliability

A measure's reliability is determined by its consistency. As indicated in Section 5.4.6, this study focused on internal consistency, measured through the coefficient of reliability (Cronbach's alpha). The assessment of the reliability of the measurement model included the following:

- Item reliability (loadings): It has been suggested that the first step to assess the measurement model is to evaluate the construct loadings (Akhter, Abdul Rahman, Jafrin, Mohammad Saif, Esha & Mostafa, 2022:8). An outer loading equal to or more than 0.70 indicates an acceptable threshold for reliability. Results for the outer loadings for this study were all above 0.7 and therefore met the criteria for individual item reliability as depicted in Table 34.
-

Table 34: Outer loadings for the measurement model

Outer loadings				
	Original sample (O)	Std. deviation (STDEV)	T-statistics (O/STDEV)	P-values
Company characteristics → EP	0.891	0.060	14.846	0.000
Improved entrepreneurial action → EP	1.077	0.025	43.294	0.000
Customer perception → project success	1.009	0.051	19.687	0.000
Project characteristics → project success	1.014	0.055	18.467	0.000
Project performance → project success	1.004	0.073	13.702	0.000
Project team → project success	0.963	0.056	17.281	0.000

Outer loadings				
	Original sample (O)	Std. deviation (STDEV)	T-statistics (O/STDEV)	P-values
Project risk ← project risk	1.000	0.000	0.000	0.000

Source: Author's compilation.

- Composite reliability: Composite reliability measures internal consistency. In exploratory research, a threshold between 0.60 and 0.70 is acceptable. As indicated in Table 35, the composite reliability for all the items in this study is ≥ 0.7 , which confirms the reliability of the measurement model (Akhter *et al.*, 2022:9; Min *et al.*, 2020:8).
- Cronbach's alpha: Generally, an accepted value for Cronbach's alpha is 0.6 to 0.7, which indicates an acceptable level of reliability, and an alpha value of 0.8 or greater indicates a very good level of reliability. All the Cronbach's alpha values for this study were > 0.8 (Akhter *et al.*, 2022:9; Min *et al.*, 2020:8).

From the information presented, the research indicates a very good level of reliability, as indicated in Table 35.

Table 35: Summary of the reliability of the measurement model

Construct	Item code	Loading	P-value	Cronbach's alpha	Composite reliability	AVE
EP						
	IEA	1.077	0.000	.802	0.764	0.324
	CC	0.889	0.000	.891	0.887	0.480
Project success						
	CP	1.008	0.000	.926	0.865	0.427
	PC	1.013	0.000	.832	0.781	0.426
	PP	1.012	0.000	.913	0.905	0.618
	PT	0.962	0.000	.899	0.783	0.397

Source: Author's compilation.

6.8 STRUCTURAL MODEL

To further validate the results of the EFA, the constructs were subjected to SEM and assessed for their ability to represent latent variables (Akhter *et al.*, 2022:8) based on four criteria for judging the research hypotheses: the goodness of fit, path coefficient, hypotheses for a structural model with moderator and moderating effect. The next stage presents the data to validate the structural model.

6.8.1 Goodness of fit

Although covariance-based SEM strongly relies on model fit, the same cannot be said for PLS-SEM. The consensus is that researchers should be attentive when considering goodness-of-fit thresholds for PLS-SEM. However, these thresholds should be viewed cautiously (Hair, Risher, Sarstedt & Ringle, 2019:7). Goodness of fit identifies how well the observed data matches the predefined model. Furthermore, based on the data obtained, goodness-of-fit values provide a numerical measure of the discrepancy between the observed and predicted variables (Oosthuizen, 2018:158).

As indicated in Table 36, five main criteria were used to determine the overall model fit for the structural model: chi-square, standardised root mean square residual, normed fit index, geodesic distance and squared Euclidean distance. SmartPLS (version 4.0) recommends 3.0 as the minimum value for the chi-square test and 0.080 as the minimum value for the standardised root mean square residual. The study's chi-square was 22.033, standardised root mean square residual was 0.028, normed fit index was 0.981, squared Euclidean distance was 0.004 and geodesic distance was 0.011, which showed an acceptable value for the proposed model (Hooper, Coughlan & Mullen, 2008:2-4; Salloum, Al-Emran, Shaalan & Tarhini, 2019:520). It indicates that the research model had a good fit.

Table 36: Goodness of fit

Goodness of fit			
Fit index	Saturated model	Estimated model	Recommendations
Standardized root mean square residual (SRMR)	0.028	0.028	Good
Squared Euclidean Distance (d_ULLS)	0.004	0.004	Good

Goodness of fit			
Fit index	Saturated model	Estimated model	Recommendations
Geodesic Distance (d_G)	0.011	0.011	Good
Chi-Square (χ^2)	22.033	22.033	Good
Normed-Fit Index (NFI)	0.981	0.981	Good

Source: Author's compilation.

6.8.2 Path coefficients

Based on the path coefficients in Table 37, the highest influence original sample value was found between project success and EP at 0.572. While in contrast, the lowest original value was for the influence project risk had on project success and EP at -0.163. The value of the standard deviation most significant influence between project risk's moderating influence on project success and EP is 0.099, against the least significant influence between project success and EP at 0.058. The most significant t-statistic value was between project success and EP at 9.903. In contrast, the lowest t-statistic value was between project risk's moderating influence on project success and EP, 1.648.

Table 37: Path coefficients

Path coefficients				
	Original sample (O)	Std. deviation (STDEV)	T-statistic (O/STDEV)	P-values
Project risk → EP	0.323	0.067	4.782	0.000
Project success → EP	0.572	0.058	9.903	0.000
Project risk x project success → EP	-0.163	0.099	1.648	0.099

Source: Author's compilation.

6.8.3 Hypotheses results for structural model

A p-value less than 0.05 is considered statistically significant on a 95% confidence interval. Table 38 indicates the hypothesis test for the structural model, which relates to the moderating role of project risk on the relationship between project success and EP.

Table 38: Hypotheses for the revised conceptual model

Relationship	Beta coefficients	T-statistics	P < 0.05	Hypotheses	Result
Project success → EP	0.572	4.782	0.000	1	Accept
Project risk x project success → EP (moderator relationship)	-0.163	1.648	0.099	2	Reject
Customer perception → project success	1.009	19.687	0.006	3	Accept
Project characteristics → project success	1.014	18.467	0.000	4	Accept
Project performance → project success	1.004	13.702	0.256	5	Reject
Project team → project success	0.963	17.281	0.005	6	Accept
Company characteristics → EP	0.891	14.846	0.000	7	Accept
Improved entrepreneurial action → EP	1.077	43.294	0.000	8	Accept

Source: Author's compilation.

H1 was accepted, as the results indicate that the relationship between project success and EP was positively and statistically significant at a 95% confidence interval ($p < 0.000$).

Therefore, these results indicate that it is possible to increase the likelihood of entrepreneurial performance when the organisation considers actionable project success activities characterised by customer perception, project characteristics, project performance and project team. It aligns with previous research by several scholars confirming that a project's goal is to have a positive impact on an organisation, improve performance and increase profits (Hanisch & Wald, 2011:6; Mir & Pinnington, 2014:204; Shenhar & Dvir, 2007: 25-27).

H2 was rejected, as the results indicate that project risk did not moderate the relationship between project success and EP. The relationship was not significant at a 95% confidence interval ($p < 0.099$). The researcher can postulate several reasons for this result. First, it can be argued that the results could have been different if a less stringent test statistic had been used (90% confidence – $\alpha = 0.1$). Furthermore, the respondents' interpretations of the section on project risk could relate to the fact that 27.4% of the respondents had less than

five years of experience within project-oriented organisations. Linked to this is that 29.5% of the respondents indicated that the value of the projects worked on was less than R10 million. Consequently, a lack of experience and the fact that the project size was relatively small could indicate that the risk of the projects was not given high consideration.

H3 was accepted, as the results indicate that the relationship between customer perception and project success was significant at a 95% confidence interval ($p < 0.006$).

H4 was accepted, as the results indicate that the relationship between project characteristics and project success was positively and statistically significant at a 95% confidence interval ($p < 0.000$). It supports the view of several authors (Rolstadås, Tommelein, Schiefloe & Ballard, 2014; Shenhar & Dvir, 2007; Shenhar, Tishler, Dvir, Lipovetsky & Lechler, 2002:113). Various contextual factors influence each project's unique characteristics at various levels and stages, which, in turn, can directly or indirectly influence its success.

H5 was rejected, as the results indicate that the relationship between project performance and project success was not significant at a 95% confidence interval ($p < 0.256$). This result was most insightful for the researcher, as perception dictates that performance results in success. The result, therefore, calls for further research and investigation as to what influenced this result.

H6 was accepted, as the results indicate that the relationship between the project team and project success was not significant at a 95% confidence interval ($p < 0.005$). Since the p -value was only above the conventional cut-off, there is evidence of an effect, albeit relatively weak. Here too, the argument can be made that a less stringent test statistic (90% confidence – $\alpha = 0.1$) could have presented a different result.

H7 was accepted, as the results indicate that the relationship between company characteristics and EP was positively and statistically significant at a 95% confidence interval ($p < 0.000$). This result confirms the implication that organisations displaying highly entrepreneurial characteristics have a favourable impact on performance.

H8 was accepted, as the results indicate that the relationship between improved entrepreneurial action and EP was positively and statistically significant at a 95% confidence

interval ($p < 0.000$). This result aligns with other research indicating that entrepreneurship is implicitly an action, albeit with a few exceptions (Lerner, Hunt & Dimov, 2018:53). Furthermore, entrepreneurship research often regards organisations' performance as the ultimate criterion for success or failure (Botha *et al.*, 2015:56). Therefore, it confirms the rationale that improved entrepreneurial action results in positive EP.

6.8.4 Moderating effect

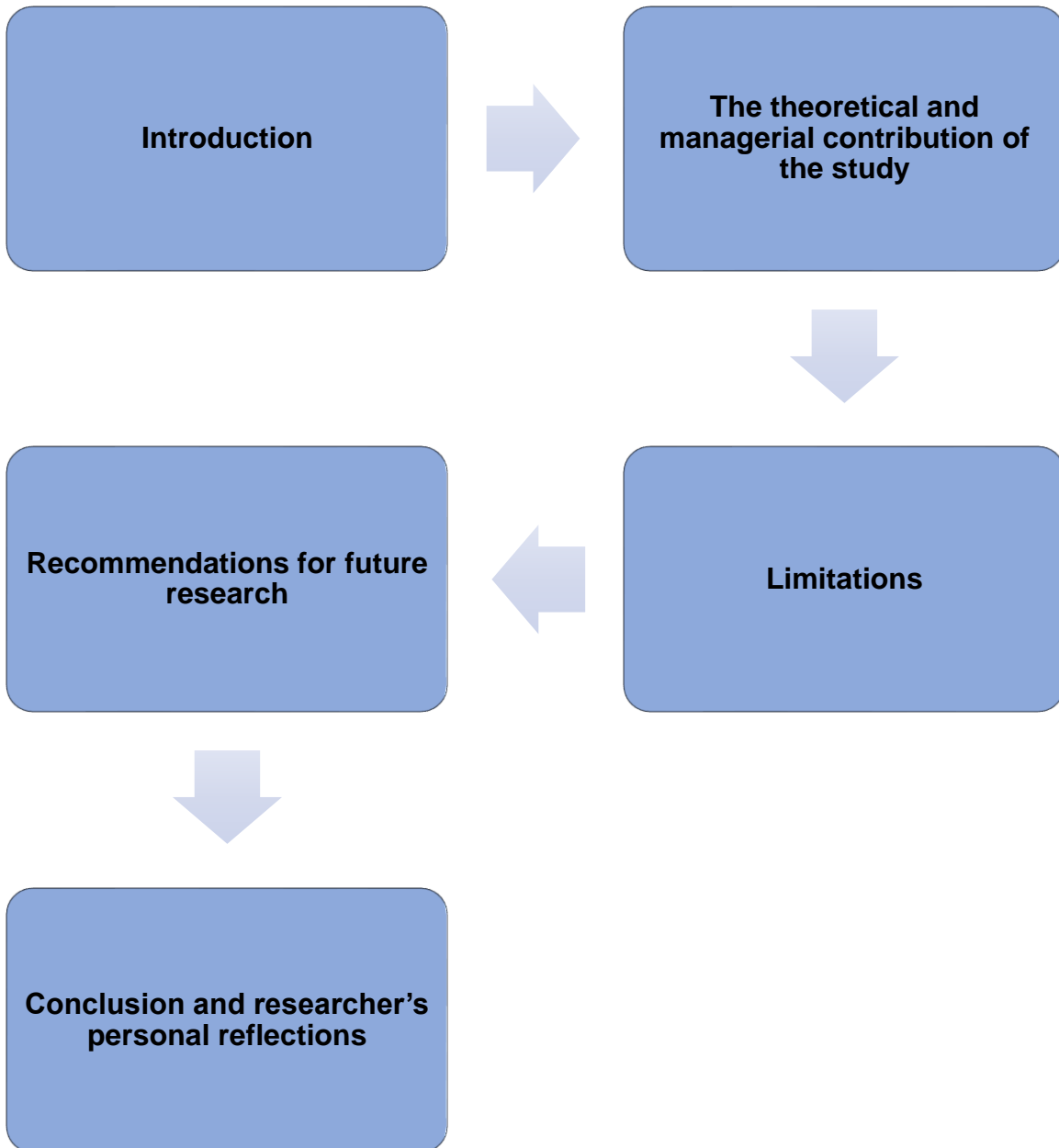
The moderator variable must demonstrate a significant interaction with the independent variable in predicting the dependent variable; in other words, it must alter the relationship between the two variables (Gómez *et al.*, 2020:379).

Table 38 (p. 131) indicate that project risk did not interact significantly with the independent variable (project success) to affect the dependent variable (entrepreneurial performance). Therefore, this study cannot confirm the moderating effect of project risk on the other variables ($p > 0.099$). Although this was not significant at a 95% confidence interval, if a less stringent test statistic were used (90% confidence – $\alpha = 0.1$), it could relate to project success. This creates an opportunity for further research.

6.9 CONCLUSION

The data analysis presented in this chapter reported on the relationship between project success and EP and how project risk moderates the relationship. The statistical method applied in this study, EFA (Figure 18 (p. 122)), identified the causal characteristics between measured factors and latent constructs. Due to the lack of a theoretical basis for predicting patterns, EFA was incorporated into the study. The information obtained from EFA allowed the researcher to revise the hypotheses. Using PLS-SEM (Figure 19 (p. 125)), the researcher evaluated the validity and reliability of the measurement model, from which the structural model was developed. A discussion of the findings, conclusions, recommendations and limitations is presented in Chapter 7. Additionally, future research recommendations are discussed, offering scholars new avenues for investigating the constructs and interrelationships found in this study.

CHAPTER 7
CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS



7.1 INTRODUCTION

Although there may be strong links between entrepreneurship and project management, these two domains are generally studied separately, even though the two disciplines are closely linked in practice. Combining both practical and theoretical perspectives allows these two disciplines to be explored from a conceptual perspective, investigating potential connections between them. Therefore, the core objective of this study was to develop and test a predictive model based on the literature presented in the various chapters of this study, from which a detailed analysis of the data was acquired to achieve the objective. Given these arguments, this study aimed to determine whether entrepreneurial performance (DV) is influenced by project success (IV) and whether project risk is a moderating factor in the relationship between independent and dependent variables. Next, a summary of each chapter is presented:

The first chapter of this study argued that the problem that contemporary organisations face is developing sustainable initiatives to improve firm performance in uncertain environmental environments (Gupta & Wales, 2017:52; Umrani *et al.*, 2018:60). As argued in Chapter 2, corporate entrepreneurship requires more entrepreneurial action, even though new projects are often met with typical start-up challenges (Kuratko & Morris, 2018:51). The researcher also asked why the performance and sustainability of entrepreneurship are so poor if it is the solution to most economic challenges. In Chapter 3, the research presented the argument(s) for project and project practice to mitigate organisations' challenges regarding their EP. Projects are essential for converting corporate strategy into action (Frefer *et al.*, 2018:1). Based on extensive research by Shenhar and Dvir (2007), this study presented project success as a multidimensional approach for achieving the organisation's strategic objectives by converting them into action. Finally, in Chapter 4, this study presented project risk as a moderator, based on the fact that risk-taking is a factor of EO and that risk is a critical component for ensuring the success of a project. A concept model was developed, and data were obtained and analysed, as outlined in Chapters 5 and 6.

Finally, this chapter presents the theoretical and managerial contribution of the research, recommendations for future research and limitations, and concludes with the researcher's reflection.

7.2 THE THEORETICAL AND MANAGERIAL CONTRIBUTION OF THE STUDY

By realising the overall purpose of this research, the study contributes partially and theoretically to the body of knowledge in two distinct research domains: entrepreneurship and project management.

Furthermore, this study lent itself to investigating a more complex relationship between the three primary constructs (project success, EP and project risk), which has, to date, received very scant empirical research attention.

7.2.1 Theoretical contribution of the study

This study explored the validity of a model for establishing the relationship between project success and EP, with project risk as a moderating influence on the relationship. Predominantly, only international research, such as that by Belfort *et al.* (2016), Martens and Carvalho (2016), Martens *et al.* (2018) and Martes *et al.* (2015), has focused on the effect that EO has on project management. Although specific research on the topic could not be identified within South Africa, some research alluded to several factors that may influence the relationship between project practices and entrepreneurship. However, more comprehensive research and understanding are required. Through empirical validation of the hypotheses presented, the study shed light on how project success affects EP. The research contributes to the development of interdisciplinary research by examining the relationship between two research fields. The research concurs with Kuura *et al.* (2014:214): “Research in the areas of entrepreneurship and project work management has followed parallel but separate paths. However, in real practice, the connections between entrepreneurship and project practice appear stronger.” Thus, this study addressed the existing gap in the literature regarding the relationship between project success and EP. This will encourage further research in these disciplines. This study thus strengthens the premise that project practice contributes to organisational performance, allowing organisations to consider how their project practice will impact their performance.

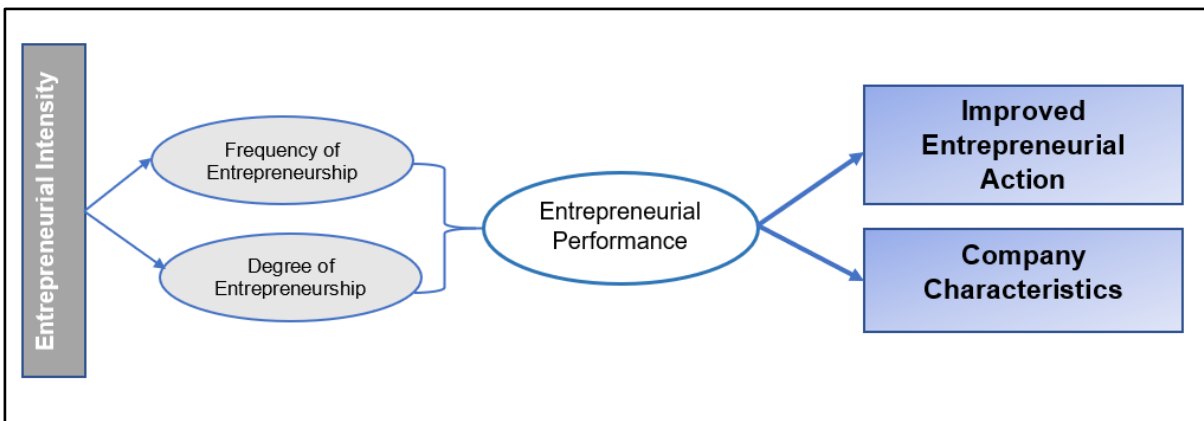
Furthermore, the study adds academic knowledge by understanding the factors of project success that influence or affect EP within project-oriented organisations. As presented in Chapter 1, the research objective was to give context to the formative power of project

success. This was done by analysing corporate entrepreneurial performance from a different and dynamic perspective. Additionally, it incorporated the moderating effect of project risk on the relationship between project success and entrepreneurial performance. Each construct is briefly discussed in the context of the research findings.

7.2.1.1 Entrepreneurial performance

This study interpreted entrepreneurial performance variables based on the literature as illustrated in Figure 20.

Figure 20: Variables for entrepreneurial performance



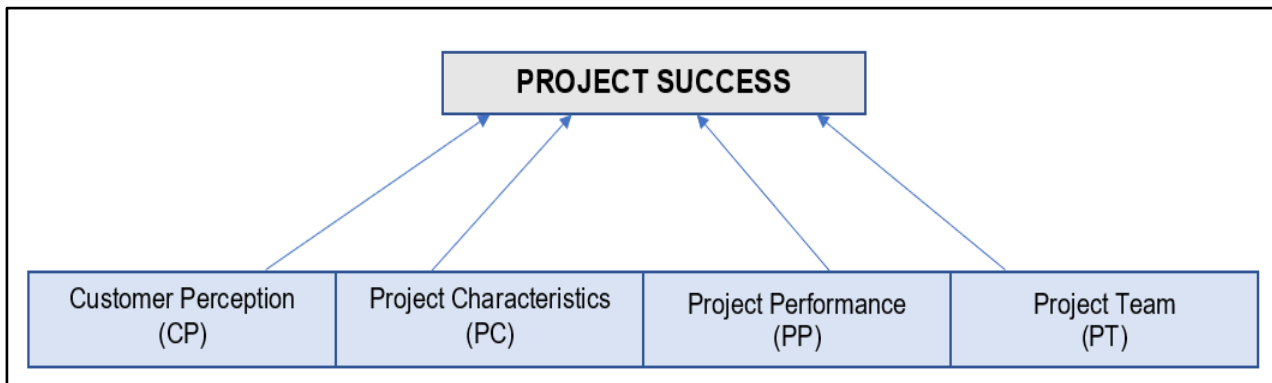
Source: Author's compilation.

From the literature (Ireland *et al.*, 2006a:10-17; 2006b:21-30; Kuratko & Morris, 2018 :46-48; Morris, 2015; Morris & Kuratko, 2002), entrepreneurial performance is derived from the frequency and degree of entrepreneurial action that an organisation exhibits (entrepreneurial intensity), from which this research identified two variables with a direct and significant effect on entrepreneurial performance. Improved entrepreneurial action could relate to how the organisation reconsiders its entrepreneurial strategies. In addition, the organisation's characteristics are intrinsically linked to its propensity to entrepreneurial action (Kuratko & Morris, 2018:43). Further research in these areas may be warranted.

7.2.1.2 Project success

This study interpreted project success variables based on the literature as illustrated in Figure 21.

Figure 21: Project success variables



Source: Author's compilation.

- **Customer perception and project success**

The term customers can be regarded as internal or external stakeholders who may be directly or indirectly affected by the success or failure of the project. Although Shenhar and Dvir (2007:25-27) identified the impact on the customer as a variable for project success, this study considered customer perception as a variable that impacts project success. The literature supports this, which regard customer perception as one of the most critical factors and indicator of project success (Dvir *et al.*, 2006:39).

- **Project characteristics and project success**

Project characteristics are greatly affected by the internal and external environment in which an organisation operates and should be considered when identifying the type of project. Various contextual factors influence each project at various stages and to different degrees, affecting its success directly or indirectly.

- **Project performance and project success**

Since performance is perceived to lead to success, it is significant that the research results did not indicate a significant relationship between performance and success. In order to determine what influenced the results, it is necessary to conduct further investigations. From a theoretical perspective, it might be insightful to identify the contracts from which project performance was derived. This will enable researchers to establish how shareholders, investment, profitability, market share, organisational performance and economic success can be constructed regarding project success.

- Project team and project success

An assessment of the project outcome is critical for the project team and managers. Therefore, the criteria for measuring success must reflect their different views. This could explain why it is difficult for practitioners and researchers to define and assess project success.

- Project risk as moderator

This study considered project risk as a moderating factor in the relationship between project success and entrepreneurial performance. In Chapter 4, the researchers presented the NTCP-diamond framework as an adaptive approach when evaluating project risk. Even though several studies have examined project risk as a moderating variable (Ahimbisibwe et al., 2015:70-71; Khan et al., 2019:220; Urbański et al., 2019:27; Zwikael et al., 2014:436), not one has investigated project risk in the context of the NTCP-diamond framework. According to research by Shenhar and Dvir (2007-173), project risk should not be considered only in terms of complexity and uncertainty. Project practitioners often neglect to recognise the underlying factors contributing to project risk. The data obtained justified considering project risk in the NTCP-diamond framework.

Most respondents regarded their project risk level as medium to high. It was even more notable that most respondents (>199) identified their projects as being influenced by pace and complexity. It is insightful since, so often, time and the project's complexity directly impact the outcome. Furthermore, technology projects were also evaluated as high risk, which is understandable as most of these projects operate at a high level of technological uncertainty. Novelty projects, which are representative of innovation, indicated low levels of risk. These projects had low levels of innovation (newness); therefore, the associated risk was not considered significant. Table 39 lists the respondents' risk level according to project type.

Table 39: NTCP project risk

Level of risk	Novelty	Technology	Complexity	Pace
1 - Low risk	146	34	29	29
2 - Medium risk	168	131	199	80
3 - High risk	54	174	130	203
4 - Super high risk	N/A	29	N/A	56

Source: Author's compilation.

Therefore, based on the theoretical contribution presented, this study advances the field of project risk research, as it provides a platform to guide and support its development. Finally, project risk can be a fundamental contributor to economic growth, especially within the South African context and how it is managed.

7.2.2 Managerial contribution of the study

"I don't create companies for the sake of creating companies, but to get things done."
Elon Musk

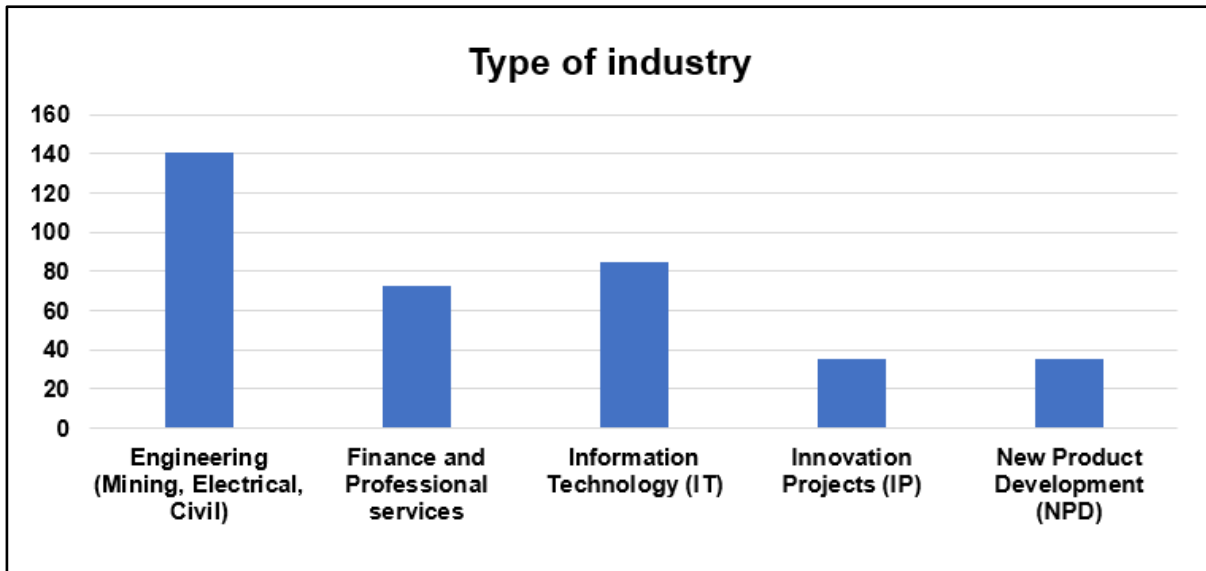
Despite the study's objective being investigative, academia must conduct research that contributes to building and expanding knowledge over time. However, knowledge can only add value if it is shared. Consequently, the research results provide insights into management and various stakeholders, adding value and expanding knowledge in the project and entrepreneurial fields. Accordingly, the section below provides managerial implications that can help top management decision-makers improve the ability of a South African organisation to grow and thrive in a challenging and uncertain economic environment.

7.2.2.1 *Entrepreneurship*

The data indicated that most respondents operated in the engineering and IT sectors. It could be self-explanatory as these sectors generally have access to more capital than others, allowing them to engage in more project-oriented activities. However, the research deliberately included innovation and new product development types of project-oriented

organisations within the sample to establish the degree of innovation and development within South African organisations, as depicted in Figure 22 (p.142).

Figure 22: Type of industry

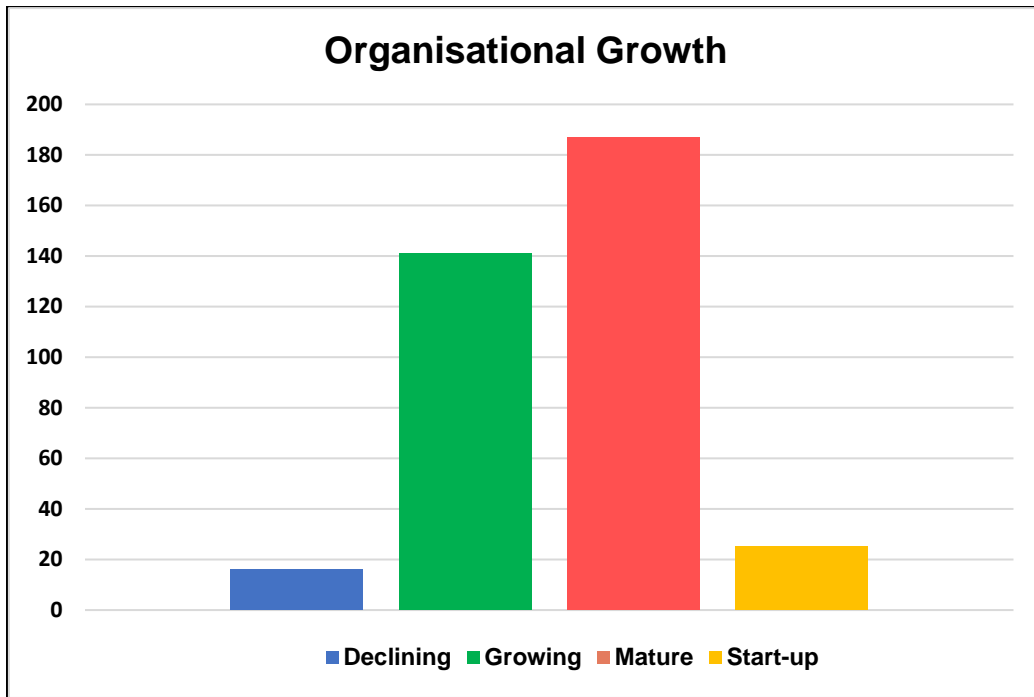


Source: Author's compilation.

Often, innovation and entrepreneurship are used interchangeably. However, as found in this study, such an approach may result in missed opportunities for established organisations. Therefore, organisations should rethink the project management office by including an entrepreneurial (temporary organisation) aspect. It allows organisations to understand the factors or variables contributing to project success and impacting organisational performance. Further, this could help organisations improve their competitiveness and growth.

Figure 23 (p. 143) illustrates demographic information regarding organisational growth.

Figure 23: Organisational growth



Source: Author's compilation.

The research results showed that less than 50% of respondents indicated that their organisations were growing. Organisations can use this information to understand what factors and variables contribute to project success and how (directly or indirectly) it affects their performance, which could improve their competitiveness and growth.

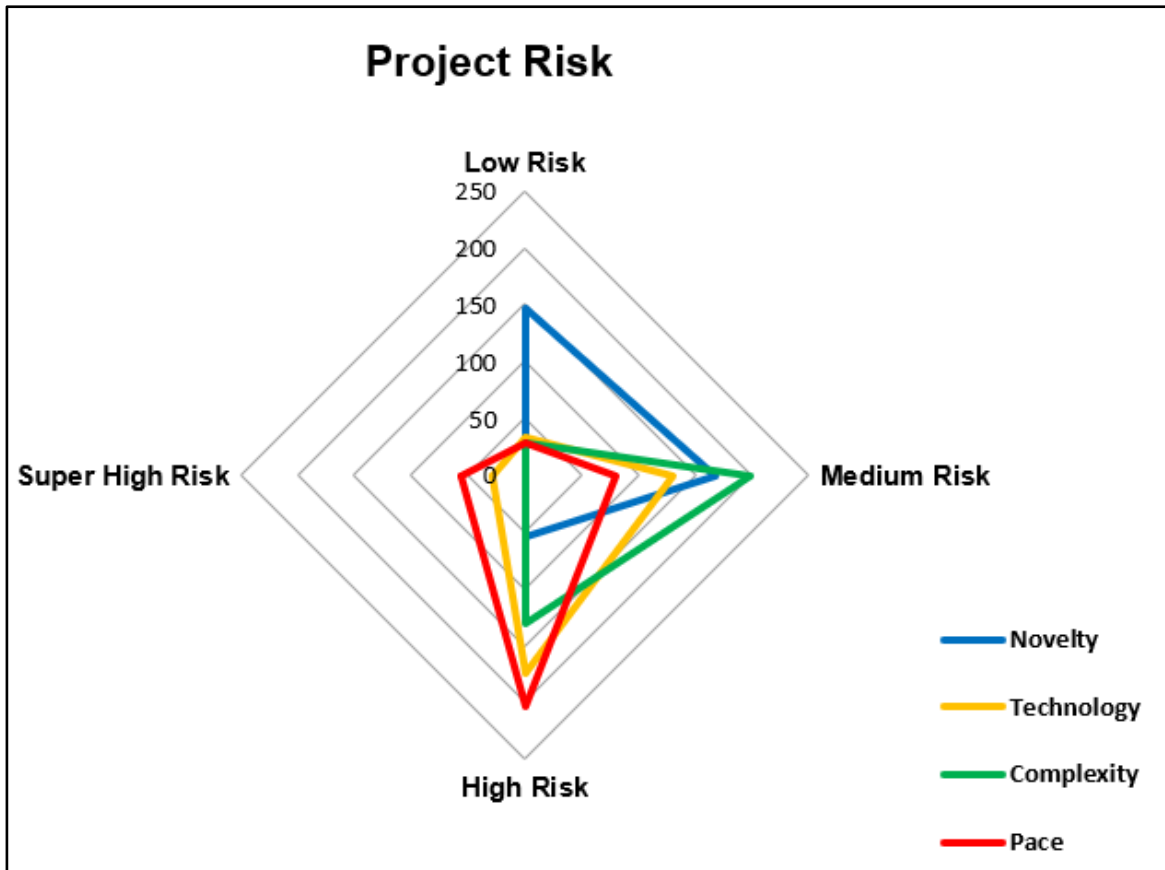
7.2.2.2 Project management

According to the data, project management practices can be aligned with an organisation's entrepreneurial activities, resulting in better project venture outcomes and competitive advantages. Therefore, project management professionals need to expand their view to appreciate that other factors can affect the success of their projects.

Consequently, managers should look beyond time, cost and quality when rating a project's success. As presented in this study, project type and factors associated with project risk (novelty, technology, complexity and pace) can provide additional knowledge to managers. Therefore, organisations that do not consider project management merely as a functional process but as an output to achieve a strategic managerial objective will develop an

environment where project success equates to organisational performance. Figure 24 illustrates the types of project risk based on the data obtained from this study.

Figure 24: Project risk



Source: Author's compilation.

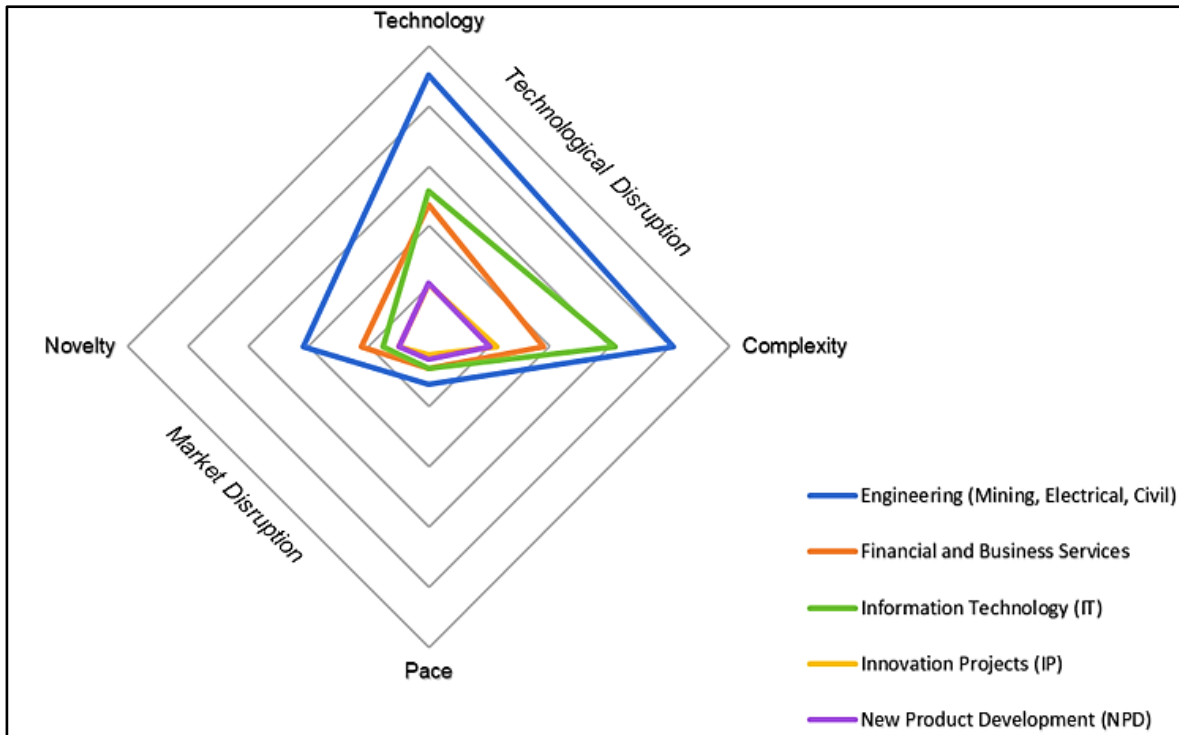
Figure 24 illustrates how managers and stakeholders can evaluate the level of project risk concerning the type of project. This method can be complementary to traditional methods used when evaluating project risk.

7.2.2.3 Linking innovation and industry type

The data from the preceding information (industry type and project risk) allowed the researcher to identify the type of innovation concerning the industries, as illustrated in Figure 25 (p. 145). The results indicated that most project-oriented organisations were involved in technological disruption. However, most of these projects were medium to high risk, which could indicate that these projects were not particularly novel or innovative. This information

gives the organisation a better understanding of their industry, how they innovate and the risks associated with their projects.

Figure 25: Linking innovation and industry type



Source: Author's compilation.

7.3 LIMITATIONS

Despite considering the most efficient design and methodology to address the objectives, this study had some limitations. The first limitation was the need for more appropriate literature on projects and entrepreneurship in the South African organisation context. Consequently, international studies were consulted as the primary source of information for the literature review. Furthermore, the focus was on project-oriented organisations, as the research focused on the organisation, not the individual.

Second, the scope of the study was restricted to investigating project-oriented organisations within three dimensions (project success, EP and project risk). Previous research considered innovation, education, planning, time and sustainability, to name a few. All these factors could be considered for evaluating project success and EP, as they provide insight into the relationship but from a different perspective. The third limitation was related to how

much work experience the respondents had in project-oriented organisations. Most respondents had less than five years' experience in project-related work (80.5%). This is in line with the fact that most respondents indicated that the value of the project they were involved with (in the past three years) was less than R10 million, indicating small projects, which influenced how the respondents interpreted the questionnaire.

Despite these limitations, it is worth noting that the results obtained were not adversely affected.

7.4 RECOMMENDATIONS FOR FUTURE RESEARCH

The following suggestions for future research are derived from the preceding research findings:

- The relationship between corporate venturing and project management practices should be investigated in similar studies. Investing or adding new opportunities within an existing organisation is a part of corporate venturing. The premise is that these ventures can be considered in terms of projects.
- While this study acknowledges that success and performance have different connotations depending on the circumstances, it does not claim that project success and EP, as presented, are at all conclusive. Therefore, longitudinal research focusing on a specific sector or organisation is recommended to provide more insight into projects and entrepreneurship per industry.
- In this research, project risk was related to novelty, technology, complexity and pace. The data obtained can be explored further to investigate how these variables can moderate the relationship between project success and EP.
- The factors presented in the hypothesised model can be used to develop relevant research hypotheses to advance the academic literature. In addition, they can be used to add value to project management and entrepreneurship practitioners.
- To what extent will teams that operate autonomously (temporary organisation) impact project success, and should EP be considered?
- As a moderating variable, the impact of technology and the level of technological intensity at which the organisation operates ought to be considered when examining the relationship between success and performance.

- Finally, it might prove insightful to investigate the correlation between the variables identified in this research. Further research may provide better insight into the relationship between project management and entrepreneurship, aiming to fill the gap in this regard.

7.5 CONCLUSION AND RESEARCHER'S REFLECTIONS

This study used a PLS-SEM model to explore the relationship between project success and EP and whether project risk moderates this relationship (and if so, how). To this end, survey responses from 369 project-oriented organisations were analysed.

The results confirmed a positive relationship between project success and EP. However, the moderating role of project risk did not confirm the relationship between project success and EP, which can provide potentially significant insights for the project-oriented organisation sector. So often, the literature promotes corporate entrepreneurship as a strategic approach that can improve an organisation's EP, as Ireland et al. (2009:19) state: "Conditions in the global business environment demand that established firms adopt entrepreneurial strategies as a path to success."

Conversely, Hanisch and Wald (2011:6) and Mir and Pinnington (2014:204) emphasise that a project's goal is to positively impact an organisation, improve performance and increase profits through growth. From this perspective, are corporate entrepreneurship and project management not merely different sides of the same coin? What if corporate entrepreneurship were viewed more as projects with temporary timeframes, budgets and stakeholder requirements, and project management acted entrepreneurially by recognising every project as an entrepreneurial output (new business)? Ultimately, the researcher wanted to convey to academics and practitioners that by focusing on project and entrepreneurship commonalities and recognising the differences as opportunities for growth, these fields ultimately contribute to the development and growth of the South African economy.

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APPENDIX A
ETHICAL CLEARANCE CERTIFICATE



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Economic and Management Sciences

RESEARCH ETHICS COMMITTEE

Approval Certificate – Conditional

19 October 2020

Mrs A.E. Snyman
Department: Business Management

Dear Mrs A.E. Snyman

The application for ethical clearance for the research project described below served before this committee on:

Protocol number:	EMS130/20
Principal researcher:	Mrs A.E. Snyman
Research title:	Investigating the relationship between project success and entrepreneurial performance
Student/staff no:	01285025
Degree:	Doctoral
Supervisor/promoter:	Prof. J.J. van Vuuren
Department:	Business Management

The decision by the committee is reflected below:

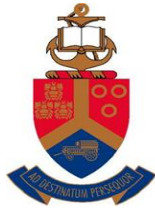
Decision:	Conditionally approved
Conditions (if applicable):	Final approval is subject to permission letters from organisation(s) being submitted
Period of approval:	2020-08-28 – 2022-04-30

Sincerely

pp PROF. J.A. NEL
CHAIR: COMMITTEE FOR RESEARCH ETHICS

Fakulteit Ekonomiese en Bestuurswetenskappe
Lefapha la Disaense tša Ekonomi le Taolo

APPENDIX B
CONSENT FORM AND QUESTIONNAIRE



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

PhD STUDY: PARTICIPATION REQUESTED

Project title:

INVESTIGATING THE RELATIONSHIP BETWEEN PROJECT SUCCESS AND ENTREPRENEURIAL PERFORMANCE

Dear Participant,

You are invited to participate in an academic research study conducted by Alet Snyman, Doctoral student (1285025) Cell: 083 271 9323 from the Department Business Management at the University of Pretoria.

Change, innovation and entrepreneurial action ought to form the ethos of organisational transformation to be relevant, successful and, more so, survive the very turbulent economic environment they perform in. Projects drive business innovation and implement strategic changes to achieve a competitive advantage; moreover, projects set goal-directed action into forceful motion. However, there is a gap in contemporary literature that has not definitively studied the relationship between entrepreneurship and project practice. **It is, therefore, the objective of this study to give context to the formative power of project success to analyse corporate entrepreneurial performance from a different and dynamic perspective.**

Please note the following:

- This is an anonymous study survey, as your name will not appear on the questionnaire. The answers you give will be treated as strictly confidential, as you cannot be identified in person based on the answers you give.
- Your participation in this study is very important to us; however, participation in this study is voluntary. You may choose to stop participation at any time without any negative consequences.
- Please answer the questions in the attached questionnaire as completely and honestly as possible; this should not take more than 30 minutes of your time.
- The results of the study will be used for academic purposes only and may be published in an academic journal. We will provide you with a summary of our findings upon request.

- Please contact the study supervisor, Prof. Jurie van Vuuren, (0)12 420 3401, (0)83 271 0020, jurie.vanvuuren@up.ac.za, www.up.ac.za if you have any questions or comments regarding the study.

General Instructions

Before you begin, make sure you understand the following instructions:

- When evaluating the questions, please respond from your experience and perspective as honestly as possible.
- Complete all sections, and do not leave any questions unanswered.
- Apply the scale provided for each of the questions.
- Indicate that you have read and understood the information provided above and participate in the study voluntarily.

1. You confirm that you have read and understood the information provided above.

Yes

No

2. You give consent to participate in the study voluntarily.

Yes

No

3. You give consent that your response may be used for academic purposes.

Yes

No

4. Are you a manager involved in product and or service project development?

Yes

No

SECTION A: DEMOGRAPHIC INFORMATION

In each section below, indicate to what extent the question is most applicable to you. Only select one option per question. You may indicate your answer by placing a cross (x) in your selected response:

RESPONDENT NUMBER V0

1. Gender

Male	1	V1	<input type="checkbox"/>
Female	2		<input type="checkbox"/>
Other	3		<input type="checkbox"/>
Prefer not to say	4		<input type="checkbox"/>

2. In what capacity are you answering these questions? (Choose one)

Business owner/entrepreneur	1	V2	<input type="checkbox"/>
Executive management	2		<input type="checkbox"/>
Senior/top management	3		<input type="checkbox"/>
Project manager	4		<input type="checkbox"/>
Functional manager	5		<input type="checkbox"/>

3. How long have you worked in this capacity? (Choose one)

Less than 5 years	1	V3	<input type="checkbox"/>
From 5 to 10 years	2		<input type="checkbox"/>
From 10 to 15 years	3		<input type="checkbox"/>
From 15 to 20 years	4		<input type="checkbox"/>
More than 20 years	5		<input type="checkbox"/>

4. What is the rand value of the projects you worked on in the last three years? (Choose one)

Less than R10 million

From R10 million to R50 million

From R50 million to R100 million

More than R100 million

1
2
3
4

V4

5. In what sector would you classify your business? (Choose one)

Engineering (mining, electrical, civil)

Information technology

Professional services

Financial and business services

Wholesale trade, commercial agents' services

1
2
3
4
5

V5

6. Businesses are classified in their sectors according to the number of employees. Choose your business sector. (Choose one)

A micro-enterprise (fewer than 5 employees)

A very small business (6 to 20 employees)

Medium enterprise (20 to 200 employees)

A large enterprise (more than 200 employees)

1
2
3
4

V6

7. All businesses go through certain life cycle phases. Choose your current business life cycle phase. (Choose one)

Start-up

Growing

Mature

Declining

1
2
3
4

V7

SECTION B: PROJECT CHARACTERISTICS

In each section below, indicate to what extent the question is most applicable to you. Only select one option per question. You may indicate your answer by placing a cross (x) in your selected response:

8. Who is your primary project customer? (Choose One)

External customer	1	V8	
Internal customer	2		

9. What is your customer’s primary project objective? (Choose one)

Strategic (primary objective is to obtain strategic positioning in the markets)	1	V9	
Extension (improving, upgrading of existing products/services)	2		
Problem-solving (acquire or develop new technology/new capability)	3		
Research and development	4		
Maintenance (routine)	5		

SECTION C: PROJECT SUCCESS ASSESSMENT

Project success refers to the goals and benefits that are gained from the project for its organisation in terms of the project’s efficiency. The strategic intent of the organisation and its business objectives should form the basis for measuring project success. In each section below, please indicate the extent to which you agree or disagree with each of the following statements. You may indicate your answer by placing a cross (x) in your selected response, using the scale:

No.	Project efficiency	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
10	The project was completed on time or earlier.	1	2	3	4	5	V10
11	The project was completed within or below budget.	1	2	3	4	5	V11
12	The project had only minor changes.	1	2	3	4	5	V12
13	Other efficiency measures were achieved.	1	2	3	4	5	V13

No.	Impact on the customer	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
14	The project improved the customer's performance.	1	2	3	4	5	V14
15	The customer was satisfied.	1	2	3	4	5	V15
16	The project met the customer's requirements.	1	2	3	4	5	V16
17	The customer is using the project's product and/or service.	1	2	3	4	5	V17
18	The customer will come back for future work.	1	2	3	4	5	V18
No.	Impact on the team	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
19	The team was highly satisfied and motivated.	1	2	3	4	5	V19
20	The team was highly loyal to the project.	1	2	3	4	5	V20
21	The team had high morale and energy.	1	2	3	4	5	V21
22	The team felt that working on this project was fun.	1	2	3	4	5	V22
23	Team members experienced personal growth.	1	2	3	4	5	V23
24	Team members wanted to stay in the organisation.	1	2	3	4	5	V24
No.	Business and direct organisational success	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
25	The project was an economic success.	1	2	3	4	5	V25
26	The project increased the organisation's profitability.	1	2	3	4	5	V26
27	The project has a positive return on investment.	1	2	3	4	5	V27
28	The project increased the organisation's market share.	1	2	3	4	5	V28
29	The project contributed to shareholders' value.	1	2	3	4	5	V29
30	The project contributed to the organisation's direct performance.	1	2	3	4	5	V30
No.	Preparing for the future	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
31	The project outcome will contribute to future projects.	1	2	3	5	5	V31
32	The project will lead to additional new products.	1	2	3	4	5	V32
33	The project will help create new markets.	1	2	3	4	5	V33
34	The project created new technology for future use.	1	2	3	4	5	V34
35	The project contributed to new business processes.	1	2	3	4	5	V35
36	The project developed better managerial capabilities.	1	2	3	4	5	V36
37	Overall, the project was a great success.	1	2	3	4	5	V37

SECTION D: ENTREPRENEURIAL PERFORMANCE ASSESSMENT

The following statements relate to entrepreneurial performance and capture both the degree and frequency of entrepreneurship, as well as the underlying dimensions of innovativeness, risk-taking and proactiveness. In each section below, please indicate the extent to which you agree or disagree with each of the following statements. You may indicate your answer by placing a cross (x) in your selected response using the scale as indicated:

No .	Company characteristics	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
38	Introduced a high rate of new products/services compared to competitors (including new features and improvements).	1	2	3	4	5	V3 8
39	Continuous improvement in methods of production and/or service delivery.	1	2	3	4	5	V3 9
40	Risk-taking by key executives in seizing and exploring growth opportunities.	1	2	3	4	5	V4 0
41	Live-and-let-live attitude in dealing with competitors.	1	2	3	4	5	V4 1
42	Seeking of unusual, novel solutions by senior executives to problems.	1	2	3	4	5	V4 2
43	Top management emphasis is to avoid new product development costs.	1	2	3	4	5	V4 3
44	Charismatic leader at the top.	1	2	3	4	5	V4 4
No .	Rate your organisation's top-level decision-making characteristics	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
45	Cautious, pragmatic, step-at-a-time adjustments to problems.	1	2	3	4	5	V4 5
46	Active searching for big opportunities.	1	2	3	4	5	V4 6
47	Rapid growth as the dominant goal.	1	2	3	4	5	V4 7
48	Large, bold decisions, despite uncertainties of the outcomes.	1	2	3	4	5	V4 8
49	Compromising among the conflicting demands of owners, government, management, customers, employees and suppliers.	1	2	3	4	5	V4 9
50	Steady growth and stability as the primary concerns.	1	2	3	4	5	V5 0

No	New product introduction	No significant	Slightly significant	Same as usual	More significant	Highly significant
51	How significant were product improvements, or revisions, introduced by your organisation during the last three years?	1	2	3	4	5
52	How significant were new products introduced by your organisation compared with those of your major competitors?	1	2	3	4	5
53	To what extent did newly introduced products exist in your markets?	1	2	3	4	5
No	New service introduction	No significance	Slightly significant	Same as usual	More significant	Highly significant
54	How significant were new services introduced by your organisation during the past three years?	1	2	3	4	5
55	How significant were the revisions, or improvements, to existing services implemented by your organisation during the past three years?	1	2	3	4	5
56	How significant were new services introduced by your organisation compared with those of your competitors?	1	2	3	4	5
57	To what extent did new services introduced include services that did not previously exist in your markets (new to the market)?	1	2	3	4	5
No	New process introduction	No significance	Slightly significant	Same as usual	More significant	Highly significant
58	How significant were new methods, or processes, introduced by your organisation during the last three years?	1	2	3	4	5

V51

V52

V53

V54

V55

V56

V57

V58

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SECTION E: PROJECT RISK ASSESSMENT

Uncertainty relates to the unknown, whereas risk is what can go wrong. However, a large component of project risk depends on uncertainty; other factors contribute to the project’s level of risk, such as complexity, time, technology and product novelty. These questions will provide a quantitative analysis to project risk assessment. On the scale provided, please indicate which value best represent your project’s risk propensity.

No.	Novelty – Level of newness of the products/services introduced in the market	Low risk	Medium risk	High risk	Super high risk		
59	Derivative (improvement/extensions of existing products/services).	1	2	3	NA	V59	<input type="text"/>
60	Platform (new generational line in existing products/services).	1	2	3	NA	V60	<input type="text"/>
61	Breakthrough (new-to-the-world products/services).	1	2	3	NA	V61	<input type="text"/>
No.	Technology uncertainty – Design and testing, timing of design freeze and design cycles	Low risk	Medium risk	High risk	Super high risk		
62	Low-tech (no new technology).	1	2	3	4	V62	<input type="text"/>
63	Medium-tech (some new technology).	1	2	3	4	V63	<input type="text"/>
64	High-tech (all, or mostly, new but existing technology).	1	2	3	4	V64	<input type="text"/>
65	Super high-tech (projects will use non-existent technologies at project initiation).	1	2	3	4	V65	<input type="text"/>
No.	Complexity – The complexity of your organisation’s projects (system scope)	Low risk	Medium risk	High risk	Super high risk		
66	Assembly (subsystem performing a single function).	1	2	3	NA	V66	<input type="text"/>
67	System (collection of subsystems performing multiple functions).	1	2	3	NA	V67	<input type="text"/>
68	Array (system of systems – widely dispersed collection of systems serving a common mission).	1	2	3	NA	V68	<input type="text"/>
No.	Pace – How critical are your project time frames?	Low risk	Medium risk	High risk	Super high risk		
69	Regular (delays not critical).	1	2	3	4	V69	<input type="text"/>

No.		Low risk	Medium risk	High risk	Super high risk
70	Fast/competitive (time to market is a competitive advantage).	1	2	3	4
71	Time-critical (completion time is critical to success – window of opportunity).	1	2	3	4
72	Blitz (most time-critical – urgent/crisis).	1	2	3	4

V70

V71

V72

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE.

APPENDIX C
ORGANISATION CONSENT LETTERS



Agrément South Africa
Office of the Chief Executive Officer
P O Box 72381, Lynnwood Ridge, 0040
Tel: 012-841-3014
Fax: 012-841-2539
RSomanje@agrement.co.za

20 August 2021

TO WHOM IT MAY CONCERN

I, **Richard Somanje**, as delegated authority of **Agrément South Africa** hereby give permission to the primary researcher **Alet Synman**, ID Number **7011210172086** of the Department of Business Management, University of Pretoria the following:

- To engage survey with the employees of the company mentioned above. I hereby give my approval for using the questionnaire questions by the researcher.
- To collect and publish information relating to the above-mentioned company that is publicly not available for the research project titled: *Investigating the relationship between project success and entrepreneurial performance.*

Please be advised that you will keep the data or research information as completely confidential and anonymous.

The information provided by the employees of the above-mentioned company is purely for academic purposes and cannot be used for any other purpose.

Regards

Mr. Richard Somanje
Acting Chief Executive Officer

innovative construction product assessments

Tel: +27 (0)12 841 3706 Web: www.agrement.co.za Email: agrement@agrement.co.za
Address: Building 17B, 2nd Floor, Scientia Campus, Merina Naudé Road, Brummeria, Pretoria

6 April 2021

To whom it may concern

STRICTLY PRIVATE AND CONFIDENTIAL

Attention – Ms Snyman
University of Pretoria
Pretoria

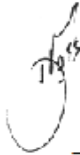
PERMISSION TO CONDUCT SURVEY RESEARCH: PhD RESEARCH FOR MS ALET SNYMAN

This letter serves to confirm that you have permission to distribute your PhD research questionnaire which seeks to solicit the expert views on the relationship between project success and entrepreneurial performance via the Commerce Edge online platform, www.smartprocurement.co.za, with a database of more than 25 000 potential respondents. Unfortunately, due to the data protection laws, (POPI Act), the email based self-administered questionnaire will not be feasible.

In order to help introduce you to the audience, we will request that you furnish us with an introductory write up introducing yourself and the purpose of the research topic, for example, your messaging can read as, "A story in <http://www.smartprocurement.co.za/> about procurement professional doing a PHD...", and then your link to the survey.

I take this opportunity to wish you all the success in your learning journey.

Yours Sincerely



David Moss
National Sales Manager
Commerce Edge South Africa
davem@commerce-edge.com



HATFIELD CITY IMPROVEMENT DISTRICT

The Fields
1065 Burnett Street
Hatfield, Pretoria
(012) 439 2370
P.O. Box 14450
Hatfield, 0025

Hatfield CID
1065 Burnett Street
Hatfield
Pretoria

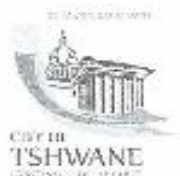
07 September 2021

ATTENTION: HATFIELD CID STAKEHOLDERS

STUDENT INVESTIGATIVE SURVEY

Hatfield CID has been approached by a PhD student at the University of Pretoria. The student is researching the "Relationship between project success and entrepreneurial performance".

To enable the student to gather critical data for her research paper, she has requested our stakeholders to complete a questionnaire survey which is enclosed in this correspondence.





The results of the survey will be used only for the purpose of the research paper findings. The information contained in the answers will not be used for any commercial or marketing purposes and your information will be safeguarded.

To further protect your rights, the student has signed an agreement in terms of the POPI Act, 4 of 2013 to this effect.

Should you have any further queries, please do not hesitate to contact our office.

Regards



Lucas Luckhoff
Chief Executive Officer



HATFIELD CITY IMPROVEMENT DISTRICT

The Fields
1066 Burnett Street,
Hatfield, Pretoria
(012) 430 2370
PO Box 14459,
Hatfield, 0028

Hatfield CID
1066 Burnett Street
Hatfield
Pretoria

07 September 2021

STUDENT INVESTIGATIVE SURVEY POPI ACT COMPLIANCE

Good Day Ms Snyman,

Further to your request to conduct a survey with our stakeholders for your research paper titled; "*Relationship between project success and entrepreneurial performance*", Hatfield CID gives consent for you to conduct the research under the following conditions as prescribed by the Protection of Personal Information Act, 4 of 2013.

1. INTERPRETATION

1.1 "Confidential Information" includes, but is not limited to:

- (a) any information in respect of know-how, formulae, processes, systems, business methods, marketing methods, product knowledge, promotional plans, financial models, inventions, long-term plans and any other information of the Stakeholder in whatever form it may be;



Directors: S Mkhivane, J. Osim-Korp, Dr D Tesher-Smith, Dr I Erasmus, S Sebokedi, B Sweetlove, B Smith, N Grobler

Company registration no.: 2004/000262/08

www.hatfieldcid.co.za

- (b) all internal control systems of the Stakeholder;
- (c) details of the financial structure and any other financial- and operational information of the Stakeholder; and
- (d) any arrangements between the Stakeholder and others with whom the Stakeholder has business arrangements of whatsoever nature, all of which the Stakeholder regards as secret and confidential.

1.2 "Personal Information" means Personal Information as defined in the Protection of Personal Information Act, 4 Of 2013, adopted by the Republic of South Africa on 26 November 2013, and includes, but is not limited to:

- (a) information relating to the race, gender, sex, pregnancy, marital status, national- ethnic- or social origin, colour, sexual orientation, age, physical- or mental health, well-being, disability, religion, conscience, belief, culture, language and birth of the Data Subject (person);
- (b) information relating to the education or the medical-, financial-, criminal -or employment history of the Data Subject (person);
- (c) any identifying number, symbol, e-mail address, physical address, telephone number, location information, online identifier or other particular assignment to the Data Subject (person);
- (d) the biometric information of the Data Subject (person);
- (e) the personal opinions, views or preferences of the Data Subject (person);
- (f) correspondence sent by the person that is implicitly or explicitly of a private- or confidential nature, or further correspondence that would reveal the contents of the original correspondence;
- (g) the views or opinions of another individual about the Data Subject (person); and
- (h) the name of the person if it appears with other Personal Information relating to the Data Subject (person) or if the disclosure of the name itself would reveal information about the Data Subject (person).

1.3 "Divulge" or "make use of" means to reveal, make known, disclose, divulge, make public, release, publicize, broadcast, communicate or correspond or any such other manner of divulging of any information;



- 1.4 "Processing" means any operation or activity or any set of operations, whether by automatic means, concerning personal- or any other information, including but not limited to:
- (a) the collection, receipt, recording, organization, collation, storage, updating or modification, retrieval, alteration, consultation or use;
 - (b) dissemination by means of transmission, distribution or making available in any other form; or
 - (c) merging, linking, as well as the restriction, degradation, erasure or destruction of information.

2. PROCESSING AND SAFE-GUARDING OF INFORMATION

The Student shall employ appropriate, reasonable technical measures to collect, process and protect the Stakeholder's information as to prevent both unlawful access to and loss or damage of the Stakeholder's Personal Information. Information collected in the survey may only be utilized for research purposes in line with the publication of the research paper.

The Student undertakes to collect Survey Information and Personal Information directly from the Stakeholder for the legitimate interest of research only, and obtain the Stakeholder's prior consent to further process the data. Data must be published in a way that does not risk the Stakeholder's / Data Subject's privacy and must only process relevant data with the given purpose.

The Stakeholder can object to and / or withdraw consent at any time and the Student must stop processing the information as soon as the notice is received.

The data shall not be used for any commercial or marketing purposes.

3. NON-DISCLOSURE

Confidential Information refers to all Data and Information relating to the Stakeholder's business or enterprise/s, including proprietary information, trade secret technology and accounting or other records which the Student has access to. All Personal Information will be subject to the Conditions of Lawful Processing under the Protection of Personal Information Act, 4 of 2013.

Only statistical research information may be published within the context of the research paper.



With your signature below you agree to collect, safeguard and store the survey information as set out in this document and comply with the conditions stated and all conditions legislated by the Protection of Personal Information Act, 4 of 2013.

Regards

A handwritten signature in black ink, appearing to read "Lucas Luckhoff", is written over a horizontal line.

Lucas Luckhoff

Chief Executive Officer

Alet Snyman (Student)

Date

PHD RESEARCH REQUESTED

Daen Schurmann <deons@mdsapm.co.za>
To: Alet Snyman <aletsphd21@gmail.com>
Cc: Marius Brandt <marius@mdsapm.co.za>

Mon, Jul 19, 2021 at 10:38 AM

Hi Alet

You have our permission to conduct the research with our organisation.

You can liaise with Marius Brandt, he has been copied on this mail. He will co-ordinate further with other MDSA staff members.

Regards

Daen

Daen Schürmann
MDSA Project Management (Pty) Ltd

Tel: +27 12 343 6865

Cell: +27 83 417 7618

Email: deons@mdsapm.co.za

Website: www.mdsapm.co.za

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Broad Based B-BBEE | Status Level: Level 4 Contributor to B-BBEE



[Quoted text hidden]