Gordon Institute of Business Science
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The impact of organisational energy dimensions on project success

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ABSTRACT

Effective project management is crucial to the successful performance of countries and organisations. In light of the recent multi-million rand project failures within South Africa including the failure to deliver the Medupi power station, the E-toll project and most recently the inability of government to role–out a R580million broadband project in Limpopo, it has become more evident than ever that project management and its success factors and success criteria require additional focus.

Organisational energy is a particular project success factor that is not well understood. The research project examined the relationship between organisational energy, its latent variables, and project success. A deeper understanding of this relationship will give organisations and government the ability to re-energise their projects and create a fertile ground for success. To test the hypotheses, structural equation modelling and regression analysis were performed. Participants' were surveyed using the Productive Energy Measure (PEM) and Project Success Questionaire (PSQ) measurement instruments.

A significant relationship between the affective and behavioural dimension and project success was discovered, while no significant relationship was discovered between the cognitive dimension and project success. This was in contradiction to research conducted by the founders of the organisational energy, who observed a relationship between all three latent variables and organisational success. To improve project success organisations and governments should place emphasis on affective and behavioural energy within project environments.

Keywords

Organisational energy, project success factors, affective energy, behavioural energy, cognitive energy.

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION TO THE RESEARCH PROBLEM

1.1. Research title

The impact of organisational energy dimensions on project success.

1.2. Introduction

A study by the Project Management Institute in 2017 highlighted that project success rates had reached a plateau, globally, since 2011 (Project Management Institute, 2017). However, in light of multiple project overruns and failures in recent years by the South African government and businesses alike, this trend may be grossly understated. This is evidenced by the fact that the South Africa economy yet again entered a technical recession in Q2 of 2018 (Gumede, 2018). These project failures include the failure to deliver the Medupi power station; inability to operationalise the E-toll system, and in recent headlines the R580million failure to deliver broadband to Limpopo and its rural areas (Lowman, 2015; Omarjee, 2018; Ngoepe, 2018).

According to Rodríguez-Segura, Ortiz-Marcos, Romero and Tafur-Segura (2016), project success factors that create fertile ground for project success can be categorised into four areas, namely project, project leadership, organisational and external environment factors. Organisational energy, which is an area of focus for this study, is categorised as an organisational factor. A plethora of academic literature is available on organisational energy and its association with organisational performance.

However, a clear understanding of the influence of organisational energy on project success is not well understood. Project success and the process through which to achieve it is an ever-evolving science and is considered the holy grail of project management (Geoghegan & Dulewicz, 2008; Muller & Joslin, 2016; Pinto & Slevin, 1987; 2006; Serrador, Gemino, & Horner, 2018).

Cole, Bruch and Vogel (2008) reported that a link exists between organisational energy and organisational performance, i.e. increased levels of energy within the workplace can substantially improve business performance. The authors noted in their study that there might be particular periods of time in which the organisation must produce focussed surges of energy. This would typically be while conducting essential group projects or when facing a pressing deadline (Alexiou, Khanagha, & Schippers, 2018; Chen, Cheng, Zhu, & Long, 2016; Welbourne, 2014a; 2014b)

Cross, Baker and Parker (2003) stated that based on their studies of multiple organisations, it is evident that increased energy within energy networks is clustered around successful projects. Therefore, it is crucial that organisations seek ways and means to increase the energy of their individuals and teams.

Welbourne (2014a; 2014b) noted that high performance requires optimising and directing human energy at work, while Alexiou, Khanagha and Schippers (2018) stated that organisational structures are mostly static and that some source of energy is required to make them dynamic in pursuit of organisational goals. While the literature suggests that organisational energy drives project performance and ultimately organisational success, the link between organisational energy and project success has not been validated by quantitative research.

A deficiency in peer-reviewed research literature exists on the drivers of organisational energy, which is due to the complexity of measuring and quantifying organisational energy. Validation studies are thus required to determine whether organisational energy correlates to organisational performance. Developing a clearer understanding of the latent variables of organisational energy will allow leaders and project professionals alike to implement interventions to improve energy levels within the workplace, which will allow them to achieve project success.

Due to multiple project failures in the South African private and public sectors, the project community must place more emphasis on understanding the critical success factors that drive project success to rectify these failures. Research shows that successful organisations can channel their collective energies to create a positive organisational climate and create the fertile ground required for project success (Irani, Sharif, & Papadopoulos, 2015).

Organisational energy is only a single aspect of all the organisational factors that assist in the success of projects, however; it is argued that transformational leadership and operational efficiency are critical factors in the achievement of positive project outcomes within the development sector (Ahmed & Abdullabi, 2017). In a study conducted by Cserhati and Szabo (2014), the authors reported that success factors could be split into relationship oriented and task focused factors. Their study articulated that project leadership, communication, and co-operation are more influential project success factors within the event planning industry.

The key objective and purpose of the research project were to determine whether an association exists between organisational energy, its latent variables, and project success. The drivers of organisational energy require further amplification and measurement, while the connection between organisational energy, project teams and project success require further research.

Now more than ever, organisations need to energise their employees toward positive project outcomes given the current South African economic downturn and its negative impact on organisational culture and climate (Gumede, 2018). Project leadership including project managers, project directors and programme managers require an appreciation for critical success factors that they can manipulate to ensure that projects are implemented within all performance constraints.

1.3. The relevance of this research in the South African context

Academic literature related to the impact of individual and team energies on project success are limited. Cole, Bruch and Vogel (2005) conducted exploratory studies to determine a model for organisational energy, but not many studies have been conducted to validate organisational energy and its latent variables. Neither this research project's first or second hypotheses are well understood in literature. It is evident from the outset that research related to organisational energy and the link to business success within South Africa is lacking; extant project management literature focuses primarily on organisational factors such as organisational climate and culture.

This study will validate the drivers of individual and team energy and ascertain their impact on project success. The research will further validate the use of the Productive Energy Measure (PEM) within South African companies and academia. To date, the only South African study by Cuff and Barkhuizen (2014) could be found that validates the use of PEM.

A report by the Project Management Institute (2017) highlighted that project success rates have remained relatively flat since 2011. Increase project failures within key public and private projects in South Africa over the past 20 years, as well as projects' inability to deliver their proposed returns, it is more important than ever that success factors for project management are researched and sufficiently understood to provide organisations with the instruments and capabilities necessary to create the fertile ground required for projects to succeed (Trejo, 2016).

The literature contains many exploratory and deductive studies that link organisational factors to successful project outcomes, but the link between organisational energy and project success is not well understood. The research project has assisted in further validating that PEM measurement instrument is viable for use as an instrument to measure employee's perceptions of energy dynamics and energy states within their project teams. Which is essential for individuals who collaborate within the workplace to achieve an organisation's key strategic objectives (Meutia, 2017).

Once organisational energy measurements become ingrained in organisational data, they will assist management in understanding what energises and de-energises their employees and teams. Interventions can then be put in place to address energy levels and future behaviours. Organisations often survey their employees using employee engagement measurement instruments, yet the question of whether organisations should collect employee engagement data or organisational energy data is a fiercely contested debate. In literature, we see that employee engagement is the ability to align employees with their organisations' guiding principles, while organisational energy refers to the internal force and ability of an employee to do work (Adarsh & Kumar, 2017).

Organisational energy can be used to improve the energy of employees and teams to make them more goal-oriented and focussed on delivering project objectives (Cole, Bruch, & Vogel, 2008). Project managers can be sent on training and development to ensure that they are energising their teams toward positive project outcomes. Secondly, energy criteria can be incorporated into selection processes so that only employees above a certain energy threshold are selected for employment (Welbourne, 2014a; 2014b).

Organisations have not focussed on organisational energy's relationship with project success, yet these two constructs are vital to the improvement of organisational performance and the ability of employees to remain energised during economic downturns. It was found that there was a scarcity of academic literature that validated the association between the organisational energy and project success constructs.

1.4. Research purpose

Based on actual evidence, the primary purpose of this research project was to evaluate the drivers of organisational energy in individual and group contexts and their impact on successful project implementation, as it is vital for leaders to understand how they can energise their teams and individuals in their workplaces by addressing the three dimensions (affective, behavioural and cognitive) and the overall organisational energy construct. The affective dimension is regarded as affective or emotional energy; the behavioural dimension is regarded as behavioural or physical energy, and the cognitive dimension is regarded as cognitive or mental energy. The constructs were named affective, behavioural and cognitive dimension within this research project.

Practical applications include tailoring organisational platforms such as performance management systems, talent management systems, structures and processes to promote organisational energy. To create better work-life balances for employees and to assist in energising the workforce, a cultural shift must take place within organisations so that an employee’s work and personal lives are not seen as mutually exclusive (Chen et al., 2016; Russo, Shteigman, & Carmeli, 2015).

Tools for measuring employee energy in the workplace on a more regular basis are vital for tailoring the organisational system and understanding when the organisation is in a de-energised state (Schiuma, Mason, & Kennerley, 2007; Welbourne, 2014a; 2014b). With a more precise understanding and measurement tool for employee energy, an organisation can develop and implement processes to select the correct employees for projects or develop project managers on organisational energy so that they can energise their teams toward project success.

Employees with high positive energy and the correct competencies can be deployed to critical projects, and low positive energy employees can undergo corrective development to improve energy levels. High positive energy employees can also energise teams and create team cohesion (Chen et al., 2016). Organisational energy as a construct, its latent constructs, and project success are of particular importance to organisations and academic fields of project management, organisational behaviour, project success, and organisational energy.

1.5. Research objectives

Theory and literature related to organisational energy were studied to gain deeper insights into the topic. The link to project success factors and how success factors influence project success were also studied. Empirical evidence was gathered via survey questionnaires from organisations that implement projects, to ascertain the strength of the latent variables of organisational energy (independent variables) and the strength of their relationships to project success (dependent variable). Table 1 articulates the research objectives for this research project.

Table 1: Research objectives

Objectives	Description
Objective 1	Define the relationship between the affective dimension and project success.
Objective 2	Define the relationship between the behavioural dimension and project success.
Objective 3	Define the relationship between the cognitive dimension and project success.
Objective 4	Define the relationship between organisational energy and project success.

Source: Author's own research

1.6. Scope of the research

The key respondents for this research project were employees who are responsible for managing projects within South African organisations. Quantitative data on organisational energy and project success were gathered from these organisations via two measurement instruments. The research data were premised on the perceptions of the employees and their understanding of the questions. These surveys were based on the Productive Energy Measure (PEM) and Project Success Questionnaire (PSQ) measurement instruments.

Limitations can be defined as factors that impact research that cannot be controlled (Simon, 2011). All research has limitations, thus a researcher must understand these limitations and identify weaknesses that may influence the usefulness of the study (Creswell, 2012). Research topic, constructs and research design limitations were identified.

- A detailed analysis on project success factors, and specifically organisational success factors, showed that although organisational energy is an important attribute, many other organisational success factors namely organisational processes, reward, organisational structure, organisational culture, and motivation philosophy, and skillsets have an influence on project success. It was posited that a link exists between organisational energy and project success, however, many other organisational factors are predicators of project success (Simon, 2011).
- A researcher may develop an appropriate sampling plan, but it is dependent on the probability distribution of the data. Falsity in a proposition can occur if miscalculated (Schutt, 2015).
- Saunders et al. (2016) stipulated that research methodology forms the crux of the project. Limitations can occur in quantitative research within two phases the planning and execution phases.
- Mediation occurs as a result of an independent variable that impacts a non – observed mediator variables and ultimately impacts the dependent variable (Mackinnon, Fairchild, & Fritz, 2007). Mediating variables were not considered in this research project and could have impacted the relationship between the independent and dependent variables.
- Survivorship bias could have occurred that created sample bias. Survivorship bias is regarded as a phenomenon where the research project focused on respondents from environments that only conducted successful projects. The fact that the research project surveyed employees within businesses that were a going concern indicates that employees conducting unsuccessful projects were not surveyed.
- The research project used a deductive approach which assists the researcher to develop a hypothesis with the use of existing theory. It is argued that deductive research does not inspire divergent thinking and limits the scope of creativities (Saunders et al., 2016).
- The environment in which the respondents answer questions is not controlled when using survey instruments. Accurate responses are highly dependent on the environment in which the respondent is answering the questionnaire (Baxter & Jack, 2008).
- This study was solely focussed on the South African context. Thus the findings are not generalisable to the international context. The sampling method resulted in most of the respondents coming from the mining industry, which may have

affected the inferrability of the results to other industries.

- Time constraints limited the scope of the study that could be conducted, and the study could only provide a cross-sectional view of reality.
- The use of surveys can cause self-reporting errors due to respondents being too embarrassed to reveal specific details or be biased by an individual's mental state or feelings on the day (Saunders et al., 2016).
- Non-probability sampling technique was utilised in the research project and was regarded as a limitation. The reason for it being regarded as a limitation was that it could result in researcher bias and it is problematic to defend the generalisability and representativity of the sample to the population. For this reason, the results are not generalisable to employees who conduct projects in alternative industries.
- The factor analysis conducted in Chapter 5 indicated a high correlation between behavioural and cognitive energy, which could have been due to ambiguity between the items measuring each factor. This observation was established by research performed by Cuff and Barkhuizen (2014), however, the results were not regarded as a critical limitation. As much as the research found a connection between organisational energy and project success, it cannot be inferred that in the presence of high organisational energy, projects will be successfully implemented in organisations, i.e. this research project merely suggests a relationship, empirically.
- Cole et al. (2012) indicated that risk exists that a random measurement error could be introduced that could possibly negatively impact the reliability of constructs. Content deficiency was regarded as a limitation as a new measure was being developed.
- Cuff and Barkhuizen (2014) identified limitations related to cross-sectional research design, survey instrument, non – probability sampling technique, representativity and inadequate sample size.
- Derman et al. (2011) identified the lack of literature related to organisational energy and empirical research as a key limitation.

Delimitations are regarded as selections made by the researcher which are articulated as boundaries that have been put in place to narrow the study (Leedy & Ormrod, 2010). The research project was limited to organisational success factors, namely organisational energy and its impact on project success. Other success factors for projects, such as project leadership and project management and techniques, exist in literature. Within organisational success factors, multiple constructs such as organisational structures, organisational processes, organisational cultures, reward and motivation philosophies and skillsets exist.

This study was specifically narrowed to organisational energy due to the dearth of research studies and literature on the topic and its impacts on project success. Only literature related to the constructs was reviewed to maintain the golden thread throughout the research project. The population was limited to South African organisations and only within certain sectors. This was due to a lack of accessibility of resources within the international environment and other sectors.

1.7. Structure of the research report

The following research project has been broken down into seven sections or chapters.

- **Chapter 1 –** Provides an background into the research objectives.
- **Chapter 2 –** Provides an outline of the academic literature and creates an argument for the need for the investigation.
- **Chapter 3 –** Describes the research questions and their relevance to the study.
- **Chapter 4 –** Offers an summary of the research methodology and the data analysis process.
- **Chapter 5 –** Sets out the statistical results of the investigation.
- **Chapter 6 –** Provides a dialogue about the research questions.
- **Chapter 7 –** Concludes the research and provides final thoughts regarding findings and implications of the research project.

2. LITERATURE REVIEW

2.1. Introduction

The main emphasis of the literature evaluation was to evaluate academic sources in relation to the research constructs being studied. The academic literature reviewed defined the concept of organisational energy and the three key variables that drive organisational energy within project teams, i.e. the affective, behavioural and cognitive dimension (Cole et al., 2005; 2008; 2012; Schiuma et al., 2007). The literature discussed below provided insights into the current theories, hypotheses and debates, which ultimately assisted in the development of the research hypotheses.

The literature evaluation is prepared as follows: an appraisal of academic literature associated with project critical success factors and project success criteria is first outlined (Pinto & Slevin, 1987; 1988; 2006). This section of the literature highlights varying viewpoints on the drivers of the successful implementation of projects and the key criteria used to measure whether a project has been successful or not.

Secondly, an evaluation of literature related to organisational energy is provided. This section expands on the fundamental models and debates regarding organisational energy and its impact on organisational performance and success. This section describes the key factors that energise and de-energise organisations at the individual, team and organisational level (Schiuma et al., 2007).

Thirdly, an evaluation of the academic literature related to the latent variables that drive organisational energy is outlined. This section highlights the individual and team energy dynamics that impact organisational energy (Vogel & Bruch, 2011). The critical factors studied here include the affective, behavioural and cognitive dimension.

Lastly, academic literature is reviewed relating to the impact of organisational energy on project success (Alexiou et al., 2018; Chen et al., 2016; Cross, Baker, & Parker, 2003; Russo et al., 2015)

2.2. Project management

2.2.1. Introduction

Project management is regarded as a recipe that assists project managers to use the methodologies, aptitudes and information at their disposal to initiate, execute and close-out a project within the defined time available, using resources provided by the organisation (Pinto & Slevin, 1987). Heagney (2012) described project management as a process-driven activity with the primary objective of achieving the goals of the project with the assistance of resources from the organisation.

Meredith and Mantel (2006) further defined project management as an exercise in initiating, scheduling, implementing, controlling and closing out a project using organisational resources to achieve project objectives and deliverables within specific project success criteria. Ali, Anbari, and Money (2008), meanwhile, the biggest problem in project-oriented environments is the ability to achieve the quadruple constraints namely cost, time, quality and scope constraints.

In recent years, however, a shift in thinking around the purpose of projects within organisations has taken place, i.e. the benefits a project provides to an organisation and the value it provides to the sustainability of the organisation is now regarded as more vital than the implementation of the project itself (Chih & Zwikael, 2015; Musawir, Serra, Zwikael, & Ali, 2017; Zwikael, Chih, & Meredith, 2018).

2.2.2. Project success criteria and factors

The holy grail of project management is project success. There are multiple aspects that influence the degree to which a project succeeds, and project success is always of vital importance to various project stakeholders. Project success is of particular interest in the academic and business world, due to the different project environments that have materialised in the past 20 years, such as space travel projects. Pinto and Slevin (1987) stated that the main success criteria for a project revolve around the iron triangle, namely time, quality and budget. However, further studies have shown that there are other criteria which are of vital importance to project success including scope, quality, customer satisfaction, and benefits realisation (Ágnes, 2018; Bayiley & Teklu, 2016; Osei - Kyei, Chan, Javed, & Ameyaw, 2017; Pinto & Slevin, 2006).

Multiple stakeholders are involved in the decision regarding whether or not a project is successful and has achieved its success criteria (Gemunden, 2015), i.e. project success can only be achieved when all stakeholders of the project are satisfied. Two mechanisms of project success exist in the literature – dependent variables and independent variables.

Project success criteria, which are the criteria a project is measured against to determine whether the project has failed or succeeded, are dependent variables, while project success factors, which create a fertile breeding ground to ensure the success of projects, are regarded as independent variables (Finch, 2003; Geoghegan & Dulewicz, 2008; Muller & Jugdev, 2012; Pinto, Patanakul, & Pinto, 2017; Pinto & Slevin, 1987; 1988; 2006). Project success criteria and factors continue to be regarded as key concerns to project managers, who need to ensure that they are able to achieve the success criteria set out during business case development and create a breeding ground within the organisation to deliver the project successfully (Fernandes, Ward, & Araújo, 2015).

Pinto and Slevin (2006) identified six project success criteria for measuring the success of projects, which include hard and soft criteria. Key to these criteria is ensuring that a project achieves the measures of the iron triangle, and project stakeholders are satisfied with the project outcomes (Albert, Balve, & Spang, 2017). A client or organisation is no longer pre-occupied with whether the project has been delivered according to time, scope and budget parameters, but is focused on the return on investment of the project or whether it is enabling other processes or functionalities within the organisation.

A point of contention is the moment when project management ends, i.e. a project may be successful in achieving its success criteria, but may not be successful in its operational phase. Martin (1990) defined critical success factors as precursor factors to project success, while Danlami, Emes-Head and Smith (2016) stated that critical success factors are the key constructs or drivers that a manager should use to create the conditions to achieve project success. Marzagão and Carvalho (2016), stipulated that in order to improve projects outcomes it is vital that organisations have a strong understanding of the project critical success factors. While a plethora of literature investigations have been performed on project success criteria and factors, research regarding organisational factors such as organisational culture, climate and energy is sparse.

Radujković and Sjekavica (2017) proposed that critical success factors should be grouped into four main areas, including the project, project leadership, the organisation and the external environment, while Muller and Jugdev (2012) classified them into four dimensions: organisational, project, people and national factors. Berssaneti and Carvalho (2015) proposed that project success factors can be classified into five groups, namely company, project management, project manager and team, contractor and environmental factors. It is clear that project managers and directors around the global grapple with how to improve success rates on projects, hence an inordinate amount of research has gone into project success criteria and factors.

Rodríguez-Segura et al. (2016) stipulated that robust consideration, by an organisation, of project success conditions and influences will improve the probability of effective project delivery. This statement has never been more important than in the current South African context. The South African economy has deteriorated over the past few years, which can be partly attributed to the failure of certain private and public projects.

Examples include Eskom's inability to deliver increased capacity to the South African electricity grid, despite the building of the Medupi and Kusile power stations, and the failure of the E-toll system to deliver significant government revenue and alleviate congestion in the central business district (Lowman, 2015; Omarjee, 2018). Taking the aforementioned failures into consideration, it may be appropriate to conduct a study concerning the relationship between organisational energy as a project success factor, and project success.

2.3. Organisational energy

2.3.1. Introduction

The first author to cite energy in the organisational context was Adams (1984), who defined it as the ability of the organisation to direct its employees toward action or undertake work. Levy and Merry (1986) later referred to this energy construct as the performance levels, motivation and intensity with which employees engage in work activities, while Thayer (1989) described organisational energy as the ability of the workforce to action key work deliverables. Loehr and Schwartz (2001) simply noted that energy is the ability of organisational members to perform work tasks. Cartwright and Holmes (2006) viewed organisational energy as a constructive stimulation which arouses employee emotions, while Cole et al. (2005) stated that organisational energy is the levels of morale, spirit, motivation and enthusiasm that create vitality and improved performance.

Schiuma, Mason, and Kennerley (2007) further defined organisational energy as a behavioural dimension that produces a feedback mechanism with motivation and organisational success, however a more recent definition by Bruch and Vogel (2011) stated that organisational energy is an intangible construct that is characterised by soft human factors that indicates the aptitude of a business to achieve its organisational strategic objectives. Despite all this research into organisational energy, low levels of energy are still being reported by global organisations (Alexiou et al., 2018).

Fernandez-Perez, Morales and Pulles (2016) explained that comprehending individual and organisational energy with regards to making a successful executive decision, which controls the decision-making process, is key. Irani, Sharif and Papdopoulos (2015), meanwhile, reported that their study provided greater enlightenment on the behaviour traits and energy characteristics of employees within the decision – making cycle in the manufacturing industry, with key emphasis on human and organisational factors.

Productive Energy Measure (PEM) is a measurement instrument that allows a researcher or an organisation to measure the degree of shared experience within the three energy dimensions (affective, behavioural and cognitive) of employees (Cole, Bruch, & Vogel, 2005). An alternative measurement instrument named EnergyScapes was proposed by Tosey (1994), which measures an individual's experience of organisational energy and articulates multiple dimensions namely integration, meaning, inspiration, activity, existence, control and community. The PEM and EnergyScapes measurement instrument were further validated in multiple organisational energy studies (Cuff & Barkhuizen, 2014; Derman, Barkhuizen, & Stanz, 2011; Tosey, 1994; Tosey & Llewellyn, 2002; Tosey & Smith, 1999).

Organisational energy is regarded as a flexible construct due to its ability to be effected by organisational constructs like levels of self-sufficiency and contributions to the decision cycle (Alexiou et al., 2018). Research on employee energy within organisations has developed into a new field of positive organisational development (Welbourne, 2014b), with researchers articulating that workers with elevated energy levels can perform better than their peers, influence their peers toward positive outcomes and develop more innovative solutions (Chen et al., 2016). Due to the team nature of project implementation and the energy dynamics involved in team environments, it is pertinent to unpack the link between organisational energy and positive project outcomes in this team environment.

2.3.2. Levels of energy within organisations

The notion of energy is instinctively widely understood in organisational life; the basic understanding is that the higher the individual energy, the higher the effort that individual places on his work. Other linkages include those between energy and innovation, team performance and job satisfaction. Three kinds of energy dimensions exist in the workplace, namely affective, behavioural, and cognitive. Organisational energy and it's three energy dimensions should be managed using different strategies in order for organisational energy to be maximised (Schiuma et al., 2007).

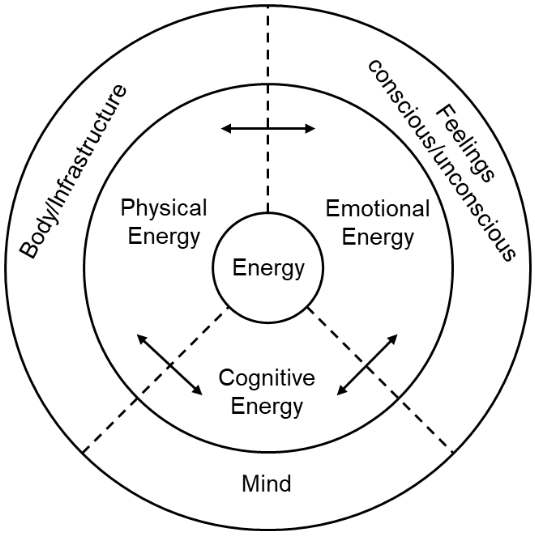
To gain clarity regarding the organisational energy construct, the smallest unit of analysis, which is the individual must be understood. Individual energy is a consequence of numerous causes, including the body's condition, the mind's condition, and feelings. These causes are categorised into three factors - physical state, cognitive state and emotional state - which are integrated in nature to produce the subsequent energy condition of the individual (Schiuma et al., 2007).

Affective energy is produced when managers provide positive feedback to employees, and constructive appraisals are experienced in the workplace. Affective energy is defined by behavioural modes and responses to social interactions that are beneficial and have the ability to generate positive organisational outcomes (Shirom, 2003). Emotional energy is underpinned by inner instincts and values. However cognitive energy is underpinned by distinctive passions and life interests. These two factors are intertwined with personality and are responsible for what type of work activities one loves and enjoys (Schiuma et al., 2007).

Behavioural energy is regarded as the ability to collectively garner support by an employee to conduct project- or work-related tasks. The ability to do work is defined as agentic behaviour and is defined as the amount of physical effort an employee or team devotes to achieving successful outcomes in the workplace (Collins, 1993). The behavioural dimension is a critical commodity that supports a company and can be intensified by inspiring employees to invest in physical resources that assist the organisation to achieve a competitive advantage (Spreitzer, Lam, & Quinn, 2011).

Cognitive energy is regarded as a cooperative understanding of the cognitive processes that cause employees to conduct work-related tasks in an industrious manner (Cole et al., 2005). Cognitive energy significantly increases when there is alignment between occupation and passion (Schiuma et al., 2007). Figure 1 illustrates the model related to the three energy dimensions that can be managed at the individual level.

Figure 1: Individual energy dimensions



Source: Schiuma, Mason and Kennerley (2007)

Team energy is regarded as a level of energy that is representative of the collective energy of the organisational members (Cole et al., 2008; Schiuma et al., 2007). The common misconception is that team energy is the sum of the individual energies within the workplace. However, it is impacted by both individual and organisational factors. Team energy is created through social interactions and organisational platforms such as performance management systems, organisational structures, and reward systems. The collective energy created by positive emotional exchanges within a project team is known as emergent energy. The energy derived from project teams is vital to individual, team and organisational performance (Aubé, Brunelle, & Rousseau, 2014; Schiuma et al., 2007).

Employees within effective teams generate knowledge and innovative ideas at a superior rate compared to employees within de-energised teams (Vogel & Bruch, 2011). During ideation and brainstorming, team members within energised teams have the ability to use cognitive energy and produce shared collective ideas, which assists in directing team behaviours toward positive project outcomes and organisational success. These energised teams then create a network effect within the organisation that starts to energise the rest of the teams in the organisation towards positive project outcomes (Fernandez - Perez, García-Morales, & Pulles, 2016; Schiuma et al., 2007). The collective generates nascent energy which is transmitted to individuals in the organisation. In this way, the collective energy can be larger than the product of the total individual energy states within the team or organisation (Spreitzer et al., 2011).

Effective teams are especially important in dynamic project environments. A study conducted by Tuuli (2018) showed that not only team dynamics are important factors in empowering individuals, but dynamic environments, integrated project teams and a high interdependence of tasks is also vital.

The organisation is related to the shared energy amongst its individuals, which arises as a result of teams' and individuals' energies. More specifically, it is the product of shared responses and experiences to contextual experiences and the cognitive, emotional and physical factors of the individuals in the organisation. The collective energy is subjective to the organisational and national context, as well as the inputs, processes and outputs in the energy scheme (Schiuma et al., 2007).

The organisation impacts its members' energy in two ways, from a strategic context and infrastructure context. With regards to strategic context, organisations form part of a broader external business environment, and the ability of the organisation to create or deplete energy is governed by its ability to align its strategic objectives to the outside environmental context. Infrastructure is related to how facilities, assets, policies, systems and procedures create or deplete organisational energy.

The construct of organisational energy is regarded as a communal concept that consists of individual and team energy and impacted by accretion, cross-level transfer and dispersal (Schiuma et al., 2007). Schiuma et al. (2007) indicated that organisations are energised through three mediums, namely all employees' individual energies, social interactions and team energies, and emergent energy.

2.3.3. Energy dynamics

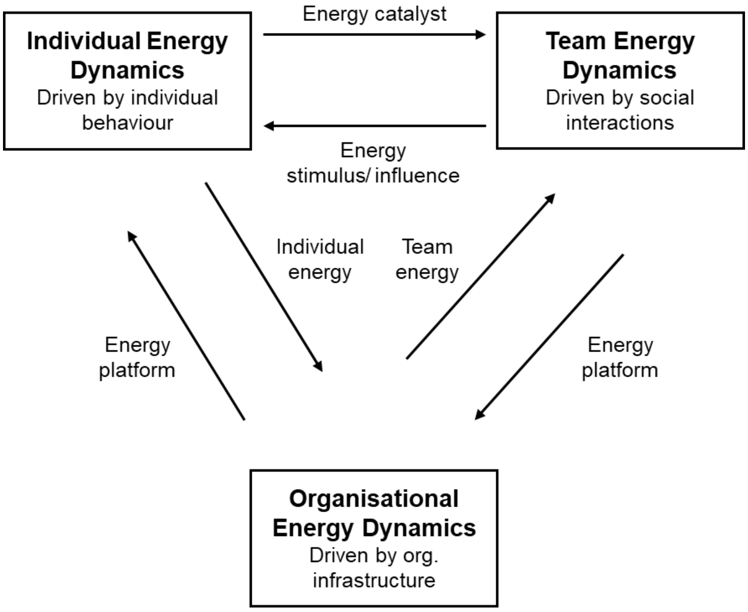
The dynamics of organisational energy is a multi-faceted process made up of individual, team, organisational and environmental energy (external environment). The four processes are linked by multi-directional processes that generate and destroy energy within organisations. Individuals, work teams and companies have specific and distinctive levels and states of energy (Schiuma et al., 2007).

Energy is dynamic; it is unceasingly changing and vacillates between creation and depletion. In the workplace, energy is influenced by variations in pressure and stress. Managing energy dynamics and its three outlets are critical to energising or de-energising the organisation. These outlets include organisational infrastructure, individual behaviour and team interactions.

The functioning of, and interactions between, sources determine the energy level and energy state at a specific time. The model below represents the levers and mechanisms for producing and managing an energised organisation (Schiuma et al., 2007). The model below depicts the physical assets such as individuals, team and the organisation that can be energised or de-energised.

The three dimensions of energy that will be studied in this research project are created or depleted within the individual and create a catalyst for the other physical assets. These dimensions can also be influenced by the other assets (Schiuma et al., 2007). Figure 2 provides an indication of the energy dynamics within an organisational system and how they influence each other.

Figure 2: Energy dynamics



Source: Schiuma, Mason and Kennerley (2007)

Organisational infrastructure is comprised of intangible and tangible dimensions, and is the instrument that kindles and promotes the creation of energy within organisations; it forms the basis of energy platforms that develop and manage individual and group energy dynamics (Albadvi, Keramati, & Razmi, 2007; Schiuma et al., 2007). These intangible and tangible aspects can be developed and implemented to create or deplete energy. Tangible dimensions include facilities and equipment, while intangible dimensions include HR practices, selection, recruitment, culture and performance management systems (Schiuma et al., 2007).

A decent example of intangible organisational infrastructure is organisational culture, as it drives the norms and assumptions that are experienced by employees and results in specific behaviours and actions, which ultimately impact organisational energy. Greenfield (2004) noted that a misalignment between organisational and individual values results in disengagement by employees. The author reported that the organisation wasted a disproportionate amount of time and energy on mechanisms that disengage employees. A study conducted across multiple sectors in Poland, meanwhile, indicated that highly engaged individuals and teams have a higher likelihood of attaining project success (Haffer & Haffer, 2016).

Team energy is stimulated by encouraging socialising and positive exchanges within the workplace. These relationships are governed by emotional contracts. During an emotional and cognitive transaction, two organisational members are engaged in a cyclical relationship of understanding, knowledge explanation and reaction. This interaction ultimately induces the generation of collective cognitive processes. During an emotional exchange, a collective emotion is induced due to the display of outward emotion, response and modification. Social interactions in the workplace serve both the cognitive and affective transactions at the individual and collective levels (Leana & Barry, 2000).

Of the utmost importance in the moulding of collective network dynamics that drive the energisation or de-energisation of individuals and teams in organisations is trust (Schiuma et al., 2007). In a study performed by Miller, Balapuria and Sesay (2015), the authors reported that interpersonal conflict could be an energising or de-energising force in a project team. The driving mechanisms of team cohesion and dynamics are not well understood and thus require further studies to understand how these factors influence the development of high-performing teams. Key factors that require further research regarding their impact on team dynamics include the effective recruitment and selection of project teams, communication, leadership attributes, and power and influence.

An individual's behavioural modes influence their energy by manipulating their emotional, physical and mental capabilities. Physical capability is correlated with physical health and conditioning; antecedents such as the day-to-day activities of human beings can influence energy levels (Irani et al., 2015; Schiuma et al., 2007). Mental and emotional capabilities, meanwhile, represent the individual psychological condition. Individual energy is influenced by factors such as reactionality and irrationality. These factors relate to an individual's desire to avoid pain, search for safety and achieve a higher purpose (Han, Lee, & Hovav, 2016; Schiuma et al., 2007). Goleman, Boyatzis and McKee (2002) stated that psychological capability is developed specifically by self-reflection processes and protection desire and stimulating wellbeing of employees.

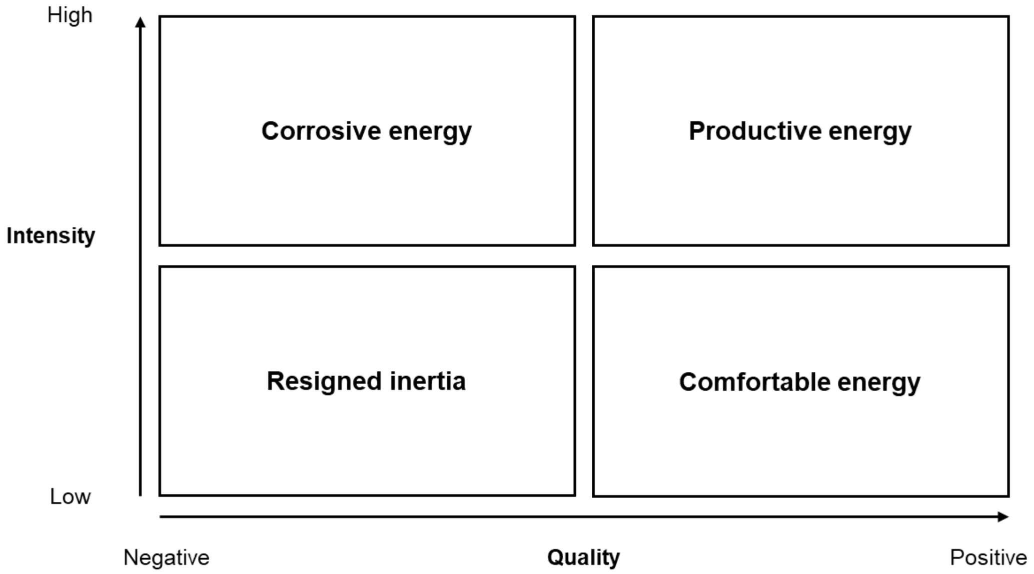
2.3.4. Energy zones

At the centre of organisational energy lies a construct called the energy matrix, which defines the energy state of an organisation. An organisation's energy state is determined by the quality and intensity of the energy (Vogel & Bruch, 2011). An organisation's energy intensity defines the ability to which it can activate its affective, behavioural and cognitive potential. The potential is regarded as the degree of interaction, watchfulness, emotional tension and communication that transpires in a company.

A distinction is made between low and high energy intensities; elevated energy intensity leads to increased emotional involvement, engagement and mental activity, while low energy intensity is characterised by decreased levels of the aforementioned states (Cole, Bruch, & Vogel, 2012; Vogel & Bruch, 2011). The quality of organisational energy is regarded as the degree to which emotional, behavioural and cognitive forces align with the guiding principles of an organisation. The energy scale is plotted from negative to positive energy, with positive organisational energy being observed as the productive use of potential energy.

It is evident that when an organisation experiences positive organisational energy, its employees focus their emotional, behavioural and cognitive energy on achieving positive project and organisational outcomes. Negative organisational energy is signified by a lack of appreciation of the corporate’s goals, which is described as an unhelpful use of the organisation's potential energy. In a negative energy state, employees’ actions and behaviours are misaligned to the organisational vision and mission (Vogel & Bruch, 2011). This research project relates to positive organisational energy, and this type of energy is measured using the Productive Energy Measure (PEM) instrument. Figure 3 illustrates the four energy states.

Figure 3: Organisational energy matrix



Source: Vogel and Bruch (2011)

The combined effect of intensity and quality maps to a simple two by two matrix that signifies four categories of energy states within organisations, namely corrosive energy, resigned inertia, comfortable energy and productive energy (Vogel & Bruch, 2011). Organisations with high productive energy are epitomised by increased levels of emotional participation, behavioural energy and cognitive alertness; organisations with high comfortable energy are characterised by high employee and team satisfaction; organisations with high resigned inertia are epitomised by employees who are mentally frustrated, emotionally withdrawn, pessimistic and have low engagement; and organisations with high corrosive energy are known for their collective hostility and negative behaviour (Vogel & Bruch, 2011).

2.4. Impact of organisational energy and its latent variables on project success

2.4.1. Introduction

The productive organisational energy dimension or construct was first defined by Cole et al. (2005) as a team phenomenon that is perceived as emotional, behavioural, and mental exchanges among project teams in common pursuit of project and organisational performance. Productive organisational energy is constructed of three energy types namely affective energy, behavioural energy, and cognitive energy. Organisational energy manifest at three levels, the individual, team and organisational level (Alexiou et al., 2018; Cross & Parker, 2004; Schiuma et al., 2007; Vogel & Bruch, 2011;).

A study performed within South Africa by Cuff and Barkhuizen (2014) reported that their research made a pertinent contribution to academic literature by validating the productive organisational energy construct as an instrument to measure positive psychological states within companies. A study conducted by Alexiou et al. (2018) further reported that productive organisational energy positively influences the implementation of emerging technologies. Tosey (1994) proposed a measurement instrument for measuring organisational energy called the Seven Energies Organisation Model that uses EnergyScapes as the measurement instrument.

This research project used the Productive Energy Measure as the measurement instrument due to the reduced number of questions and the time requirements for the study. It was found that limited validation studies had been conducted using the

EnergyScapes measurement scale.

2.4.2. Impact of affective dimension on project success

Affective energy is achieved as a result of positive assessments of work-related experiences and conditions (Cuff & Barkhuizen, 2014). Shirom (2003) stated that affective energy is an emotional reaction to a work situation that promotes a particular behaviour within the workplace. Affective energy is perceived as positive emotional and behavioural exchanges within project teams, i.e. feelings such as eagerness, concentration and motivation toward tasks or project tasks are experienced (Cole et al., 2012).

Chen, Cheng, Zhu, and Long (2016) discovered that employee energy is a form of positive emotional stimulation that is noticed as a mood or emotion, which leads to employees trying to select activities or responsibilities that advance their energy states and levels. The author also ascertained that higher levels of emotional energy lead to an increased ability to achieve work deliverables.

In addition, as per Russo, Shteigman and Carmeli (2015), when an employee is getting social support from a family member or friend, it can advance their emotional capital, making it easier for them to attain their organisational and life goals. The authors stated that the affective dimension of an employee is only partly dictated by the workplace, while the rest is dictated by the home environment.

Russo et al.'s (2015) research was primarily directed toward the optimal state of an organisation and emphasised the significance of positive energy dynamics that result in increased human resilience, wealth, and training and development. They concluded that an equilibrium must be achieved between work and non-work activities to unleash positive energy.

It is pertinent, due to the increasingly competitive landscape, that employees' emotional energy is fostered in the workplace so as to achieve organisational and project performance. Managers should thus look to develop basal energy-oriented management relationships that increase emotional energy in the workplace (Chen et al., 2016).

Another outlook is to start utilising emotional energy criteria during employee selection, employee development and team building, as it has been reported that teams can be stimulated toward positive outcomes through the introduction of high affective energy employees. (Acikgoz, Gunsel, Bayyurt, & Kuzey, 2014; Goleman, Boyatzis, & McKee, 2002; Schiuma et al., 2007). Teamwork is regarded as a crucial activity in the achievement of successful project outcomes and selection criteria regarding the emotional state of project teams are put in place to either assist employees emotionally, or at the onset to select employees with higher emotional energy (Gallagher, Mazur, & Ashkanasy, 2015).

Recent international and South African studies positively associated high affective energy with increased performance or ability to achieve work-related tasks (Chen et al., 2016; Derman et al., 2011). In particular, a study performed in Pakistan within the construction industry showed that emotional intelligence, which is regarded as a similar construct to affective energy, had a positive relationship with project success (Sarwar, Nadeem, & Aftab, 2017).

A research study by Allen, Carpenter, Dydak and Harkins (2016) also reported that leaders that implement projects require a strong emotional maturity to attain team cohesion and positive project outcomes, while Dane and George (2014) reported that emotional energy as a construct is mostly measured in the present tense and not much consideration is given to forecasting. In this case, reward and motivation philosophies must be tailored to achieve desired emotional energy levels. To maintain the correct levels of emotional well-being and energy in project teams, it is imperative that emotional energy and project success and its relationship is well understood. This study thus aimed to understand this relationship within the South African environment.

Other key predictors that measure the emotional state of employees and its impact on project success include emotional maturity, emotional intelligence, interpersonal competence and relationships (Connolly & Reinicke, 2017; Glodstein, 2014; Huffman & Kilian, 2012), resilience (Mahmud, 2017), affective forecasting (Dane & George, 2014), employee psychology, self-awareness, and self-consciousness (Allen et al., 2016; Trejo, 2016).

2.4.3. Impact of behavioural dimension on project success

The behavioural energy is regarded as the physical dimension of organisational energy and creates a drive within organisational members to achieve positive project outcomes (Spreitzer et al., 2011). Energy formation for the attainment of project and organisational objectives is a function of individual behaviours and social interactions (Schiuma et al., 2007).

The behavioural dimension relates to the amount and quality of physical activity and exertion an organisational member uses to achieve project and organisational success (Cole et al., 2012). Teams that display high levels of behavioural energy display high levels of team cohesion, which ultimately results in benefits for the organisation (Alexiou et al., 2018).

In an environment that displays productive organisational energy, human resource management systems yield positive psychological contracts, which result in organisational commitment due to employees displaying positive attitudes and behaviours. Behavioural energy encourages teamwork amongst organisational members and augments employees' abilities to complete project tasks (Han et al., 2016). High positive energy employees characteristically show high behavioural energy (Chen et al., 2016).

An international study illustrated that behavioural energy encouraged teamwork amongst organisational members and augmented their ability to complete project tasks (Han et al., 2016). A study that took place in South African indicated that organisational energy was measured using the EnergyScapes Profile (ESP) scale, which measured the behavioural construct as the energy of activity. This construct showed a strong positive relationship with successful organisations (Derman et al., 2011).

A recent study from Brazil also reported that entrepreneurial orientation, which is measured using five unobserved variables (risk-taking, innovativeness, proactiveness, autonomy and competitive aggression), has a positive impact on project process. All of these unobserved variables require or are related to physical energy. Thus it is postulated that entrepreneurs have high amounts of behavioural energy which lends itself to project success (Ahmed, Ali, & Ramzan, 2014; Martens, Machado, Martens, Silva, & Frietas, 2018).

Organisational citizenship behaviour and helping behaviour (behavioural energies) were further identified in the relationship as mediating variables between workplace bullying and project success within virtual teams (Creasy & Carnes, 2017). Bayiley and Teklu (2016), however, reported that intellectual capital, which is a similar construct to cognitive energy, was the most important factor for project success within international development projects in Ethiopia. To drive the correct behaviours within organisations and maintain the correct levels of behavioural energy, it is imperative that the constructs of behavioural energy and project success and their relationship is well understood.

Other key predictors that measure the behavioural state of employees and its impact on project success include organisational commitment (Oppong, Chan, & Dansoh, 2017), organisational citizenship behaviour, and helping behaviour (Creasy & Carnes, 2017)

2.4.4. Impact of cognitive dimension on project success

The cognitive dimension is regarded as the intellectual processes and flows that allow employees to actively participate in the problem-solving process and actively seek solutions; team members are cognitively stimulated and mentally attentive to achieving project and organisation goals and missions (Vogel & Bruch, 2011). An upside to communal cognitive energy within teams is that it results in more enthusiastic attitudes, improved organisational and project outcomes, and effective team processes (Mazur, 2014).

Those who live peaceful lives are inclined to have optimum mental and physical energy (Russo et al., 2015). It is believed that employees who find congruence in their lives are less affected by negative and destructive thoughts, while employees who live unstable lives are inclined to dedicate inordinate quantities of their time to issues relating to work-life pressure (Spreitzer et al., 2011).

Employee energy, a similar construct to organisational energy, is regarded as a cyclic mechanism and related to an employee’s physical and mental states. These can be rejuvenated with rest and activities that improve well-being (Chen et al., 2016). The psychology of employees is habitually not incorporated into the organisational strategy, yet psychological contracts are vital in stimulating the collective and social interactions that positively influence project and organisational performance (Alexiou et al., 2018).

Prosocial environments within the workplace release cognitive energy so that employees are innovative in pursuing solutions, being flexible and being mentally alert (Russo, Shteigman, & Carmeli, 2015). A study conducted by Mazur (2014) showed that cognitive energy positively impacts successful project outcomes. In two South African studies, organisational energy was measured using the EnergyScapes Profile (ESP) and the PEM scale, both of which found a positive impact on organisational performance (Cuff & Barkhuizen, 2014; Derman et al., 2011). Within the ESP scale, cognitive energy was measured as the energy of control (Tosey, 1994).

In a study conducted in Taiwan on new product development (NPD) projects, the results showed that the cognitive capabilities was the most desirable trait for project managers and it acted as a moderating variable and yielded improved NPD efficiency. However, contrary to the research above, a further study found that the conscientiousness dimension was seen as the most desirable trait in an effective project manager. The study classified seven traits of an effective project manager, namely extraversion, openness, cognitive abilities, capabilities, agreeableness, conscientiousness, and other qualifications. To improve team mental processes and energise teams toward innovative solutions, it is imperative mental energy and project success constructs, and their relationship is understood.

Other key predictors that measure the cognitive state of employees and its impact on project success include cognitive ability and cognitive capability (Aretoulis, Papathanasiou, Zapounidis, & Seridou, 2017).

2.4.5. Impact of organisational energy on project success

It is evident from the business and academic literature that private and public sector projects often fail due to a lack of understanding of the critical success factors that would enable these projects to be more successful (Vijayabanu & Vignesh, 2018). For this reason, it is important that project stakeholders start thinking differently about how to create the fertile ground for project success.

While the failure to implement projects successfully has a substantial impact on the organisational success of companies, it often has a crippling effect on the economy. The idea of organisational energy as an important and renewable resource is vital to the success of projects and project management (Cross & Parker, 2004).

By improving knowledge and consideration of reasons that influence productive organisational energy, it will be possible to encourage positive energies and eliminate the sources of negative energies that impact project success and ultimately organisational performance (Alexiou et al., 2018). Project management institutions are constantly conducting research on the holy grail of project success factors, which include organisational factors such as organisational energy.

It is obvious in some organisations that positive organisational energy surrounds their employees and teams, and that organisations create the platform for this positive energy. Within these organisations, idea generation is a norm, as are high levels of employee motivation and engagement (Han et al., 2016). However, in other organisations, specifically in mining and state-owned entities, employees describe the atmosphere as toxic or negative (Heyns & Mostert, 2018).

The UK Cabinet has acknowledged the importance of organisational energy in its Management of Portfolios guide. Within this guide, organisational energy is regarded as the key promoter of effective portfolio management. The guide articulates that the project and programme world is dynamic and that organisational energy can power a project's lifecycle and drive the delivery of projects and programmes. There is scant literature regarding how to harness and optimise collective energy in the achievement of project success and delivery (Lee-Kelley & Macnicol, 2015).

Managing energy in the workplace or project environment is crucial, as it inspires, motivates and initiates teamwork amongst project members (Schiuma et al., 2007). Cole et al. (2008) theorised that companies with low energy levels find it difficult to improve project and organisational performance. Therefore it is crucial to creating work environments that are compassionate, challenging, rewarding and mentally stimulating in order to energise employees within the team context (Meutia, 2017).

Cross et al. (2003) stated that in some organisations, organisational energy is characterised according to the energy created by specific individuals or teams. The authors argued that by analysing clustering in the energy network, one could observe the correlation with the success of projects. Highly energetic employees and teams produce successful projects, and the most innovate solutions, while low levels of energy are correlated to employees leaving the organisation.

Specifically, influential leaders have the ability to reinvigorate employees and organisations. In assessing energy networks, influencers are forerunners to project success (Chen et al., 2016). Strang (2011) also determined that persuasive and believable leaders are considered energisers who can spark progress on projects within teams, subsequently increasing employee satisfaction and working experiences.

Two South African studies indicated that organisational energy, as measured by different scales (ESP and PEM), have a positive impact on organisational success or performance (Cuff & Barkhuizen, 2014; Derman et al., 2011), while a study performed in Chinese insurance companies provided feedback that employees with high energy, are referred to as having plump wings, and are able to complete tasks and actions efficiently and effectively (Chen et al., 2016).

Contrary to the above, a study conducted by Cserhati and Szabo (2014) reported that success factors could be split into relationship orientation and task focus. Their research suggested that factors that are oriented toward relationships such as co – operation, project leadership and stakeholder communications are more prominent in influencing project success in event projects. A study by Waller (2015) indicated that leadership style had an impact on project success within the public sector environment.

Other key predictors that measure the behavioural state of employees and its impact on project success include organisational structure, organisational processes (Petro & Gardiner, 2018), reward and motivation philosophy, and culture (Golea & Balogh, 2015; Serrador et al., 2018)

2.5. Conclusion

Two of the main challenges facing organisations is the successful implementation and strategic alignment of projects (Fernandes et al., 2015; Huang, Ma, & Lee, 2015). From the literature, it is evident that a key component of ensuring that an organisation performs well and that its projects are successful, is individual and team energy (Schiuma et al., 2007).

Quantitative and deductive studies have shown a noteworthy association between individual and team energies and organisational energy (Cole et al., 2008; Cross et al., 2003). However, there are limited empirical studies about organisational energy and its impact on project success and increased organisational performance.

The literature review described instruments such as the Productive Energy Measure (PEM) which was used to measure organisational energy and the Project Success Questionnaire (PSQ) which was utilised to measure project success (Pinto & Slevin, 1988; Cole et al., 2012). A clearer understanding of the relationships between these constructs will allow organisations to better incorporate them into selection criteria when hiring project professionals, as well as assist companies to understand which crucial factors energise project professionals and teams.

3. RESEARCH HYPOTHESES

3.1. Introduction

The research project focused on gathering empirical evidence to ascertain whether there is a relationship between organisational energy, its latent variables, and project success. The study thus explored if organisational energy is a possible predictor of project success. Limited studies were performed in the South African environment on the PEM instrument, and there is limited quantitative research regarding whether a relationship exists between organisational energy and project success.

It was not assumed that project success was completely illuminated by the independent variables. Further, to this fact, it was not inferred that project success is completely due to the presumed predictive power of the independent variables. Four hypotheses were considered with regard to the organisational energy and project success constructs.

Cole et al.'s (2012) productive organisational energy measure was selected for this study due to the fact that more validation studies had been conducted by multiple researchers on the measurement instrument when compared Tosey's (1994) EnergyScapes measurement instrument (Alexiou et al., 2018; Cole et al., 2005; 2008; 2012; Cuff & Barkhuizen, 2014). The PEM was developed to measure organisational energy levels according to the individuals in an organisation. Pinto and Slevin's (1987; 1988) theory of project success was selected as the measurement instrument for this research project due to multiple validation studies on the measurement instrument (Albert et al., 2017; Muller & Jugdev, 2012; Pinto & Slevin, 1987; 1988; 2006).

This research focused on the relationship between the following five variables:

- Affective dimension (AD) is produced when managers provide positive feedback to employees, and constructive appraisal is experienced in the workplace (Shirom, 2003).
- Behavioural dimension (BD) is regarded as the ability to collectively garner support by employees to conduct project- or work-related tasks (Cole et al., 2005).
- Cognitive dimension (CD) is regarded as a cooperative understanding of the cognitive processes that cause employees to conduct work-related tasks in an

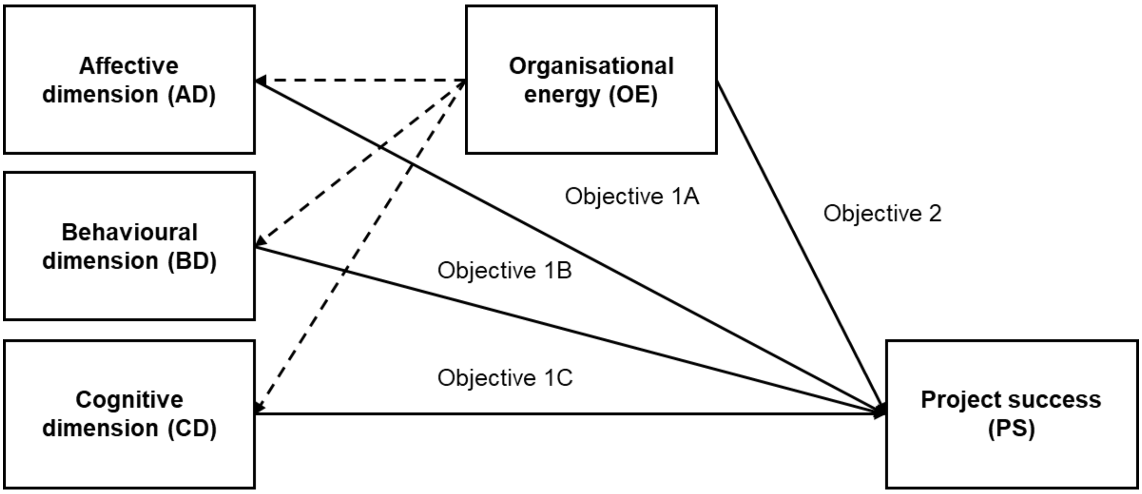
industrious manner (Cole et al., 2008).

- Organisational energy (OE), the aggregate construct of AD, BD, and CD. Relates to the morale and enthusiasm that leads to increased performance and vitality within organisations (Cole et al., 2005).
- Project success (PS) is the ability to achieve results on a project, meeting costs, schedules, quality, safety and stakeholder needs criteria (Muller & Jugdev, 2012; Pinto & Slevin, 1987; 1988; 2006).

3.2. Conceptual and theoretical framework

The research design was clarified using a conceptual and theoretical framework that clearly articulated the independent and dependent variables and the hypothesised relationships. (Burns & Burns, 2008; Green, 2014). The conceptual framework was used to develop the theoretical framework. As described in the conceptual model below the affective, behavioural, and cognitive dimensions are regarded as latent variables of organisational energy. Figure 4 illustrates the conceptual framework:

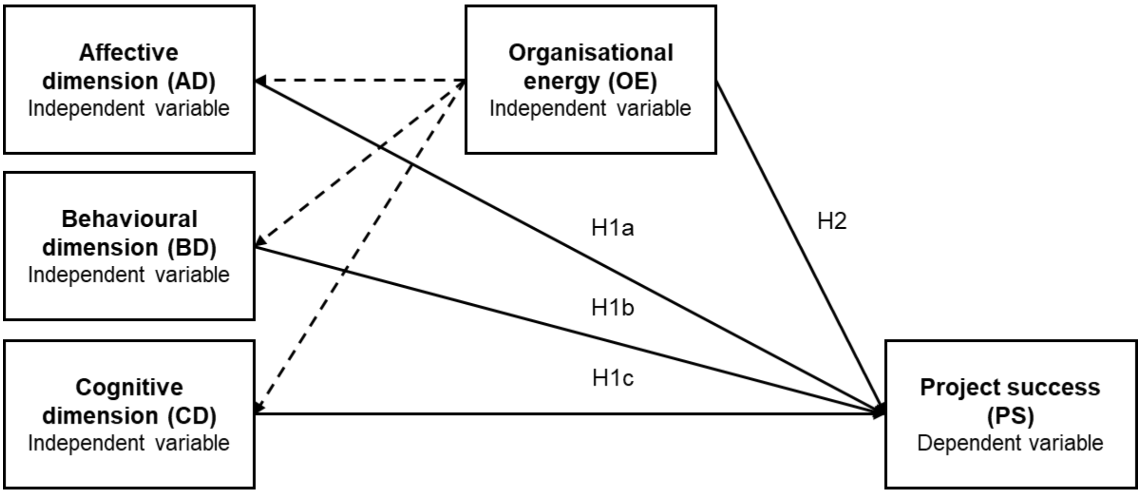
Figure 4: Conceptual framework



Source: Author's own research

Figure 5 illustrates the theoretical framework:

Figure 5: Theoretical framework



Source: Author's own research

3.3. Research hypotheses

To ascertain the strength of the linear relationship, a correlation analysis was conducted to determine the Pearson's correlation coefficient. Thereafter the amount of variation in the predictor variable that is elucidated by the outcome variable could be measured, regarded statistically as the coefficient of determination. The final step in the process was that the regression model was tested for significance at the 95% confidence limit (Wegner R., 2014).

The following assumptions were met in order to conduct factor analysis and multiple regression analysis. These include:

- **Normality –** Multivariate and univariate normality must exist in the dataset in order to conduct factor analysis (Yong & Pearce, 2013; Field, 2013). Normal distribution was tested by examining kurtosis and skewness in the dataset using SPSS. Hair et al. (2010) recommended that data is regarded to be normally distributed when its skewness is between -2.58 and +2.58 and if its kurtosis is between -7 and +7 (Awang, 2014).
- **Outliers –** Factor and regression analysis are sensitive to outliers with high and low scores (Pallant, 2005). For this reason, univariate and multivariate outliers must be removed from the dataset before analysis can be conducted. The

Mahalanobis distance and the critical chi-square statistics were used to remove outliers. The degrees of freedom were ascertained by utilising the number of questions or items in the measurement instrument, thereafter, the critical chi-square value could be determined (Pallant, 2005). Using the Mahalanobis method, 16 outliers were removed from the dataset.

- **Linearity** – Linear relationships must exist between the factors and variables measured using correlations (Wegner R., 2014). Linearity denotes the constant slope of change that represents the independent variables and dependent variable relationship. If this relationship is inconsistent, then the SEM analysis will be inaccurate (Wegner T., 2016). Visual inspection can be used to determine whether residual scatterplots of each dependent and independent variable relationship is linear (Hair et al., 2010). Curve estimation was used in SPSS to ascertain whether linearity existed between predicator and outcome variables.
- **Factorability** – A factor should contain at least three variables (Comrey & Lee, 1992). The Kaiser-Meyer-Olkin (KMO) test and Bartletts' test of sphericity provide insight into whether factorability has been achieved. The criteria for factorability included (KMO>.6) and a significant Bartletts' test (p<.05) (Pallant, 2011).
- **Sample size** – Each variable must contain a minimum of 5 to 10 observations per item to conduct factor analysis (Comrey & Lee, 1992). A minimum number of absolute observations for factor analysis is 150 to 300 (Hutcheson & Sofroniou, 1999), however, to conduct regression analysis with four predictor variables a minimum of 150 cases is required (Anderson et al., 2017).
- **Multicollinearity** – The existence of multicollinearity is not appropriate for factor analysis, and multicollinearity exists when high correlation coefficients are present among the independent variables. To test for multicollinearity, the Variance Inflation Factor (VIF) were studied. To perform a factor and regression analysis on the dataset, a VIF<10 had to be achieved to specify the absence of multicollinearity (Hair et al., 2010; Field, 2013).

3.3.1. Organisational energy factors

The literature review indicated that multiple factors influence project success, which can be categorised as follows project leadership, project management, organisational and external environment factors. The organisational energy construct and its latent variables are classified under organisational factors.

When conducting quantitative research, it is important to develop hypothesis statements and describe the relationships between the independent and dependent variables (Creswell, 2012). A two-tailed hypothesis was utilised in order to test all the hypotheses. The following statistical tests were used to determine the extent of the association between the independent and dependent variables.

The multiple regression model is defined in Equation 1:

Equation 1: Multiple regression for organisational energy factors and impact on project success (RQ1)

$$Yi = ß_0 + ß_1X_1 + ß_2X_2 + ß_3X_3 + ß_tX_t$$ Yang and Miller (2008)

Null hypothesis: H_0: $ß_1 = 0$ $ß_2 = 0$ $ß_3 = 0$ $ß_t = 0$

Alternative hypothesis: H_0: $ß_1 \neq 0$ $ß_2 \neq 0$ $ß_3 \neq 0$ $ß_t \neq 0$

The variables defined for the multiple regression are as follows:

- **Independent variables** – affective dimension, behavioural dimension and cognitive dimension.
- **Dependent variable** – project success.

3.3.1.1. Research question 1a: Affective dimension

Research question one (RQ1a): Can it be predicted with reasonable accuracy that a relationship exists between the affective dimension (AD) and project success (PS)?

- **Null hypothesis one ($H_0$1a):** No significant relationship exists between the affective dimension (AD) and project success (PS).
- **Alternate hypothesis one ($H_1$1a):** A significant relationship exists between the affective dimension (AD) and project success (PS).

In recent South African and international studies, high affective energy was positively associated with increased performance or ability to achieve work-related tasks (Derman et al., 2011; Chen et al., 2016). These studies used similar models to the PEM with similar antecedents. Various other research studies have illustrated the extent of the relationship between human emotion constructs and project success (Dane & George, 2014; Allen et al., 2016; Sarwar et al., 2017). It was pertinent to understand whether the emotional state of employees and works teams had an impact on project success, yet no study had directly measured the relationship between the affective dimension, as per the PEM instrument, and project success, hence the hypothesis was formed.

3.3.1.2. Research question 1b: Behavioural dimension

Research question one (RQ1b): Can it be predicted with reasonable accuracy that a relationship exists between the behavioural dimension (BD) and project success (PS)?

- **Null hypothesis one ($H_0$1b):** No significant relationship exists between the behavioural dimension (BD) and project success (PS).
- **Alternate hypothesis one ($H_1$1b):** A significant relationship exists between the behavioural dimension (BD) and project success (PS).

In a recent international study, behavioural energy encouraged teamwork amongst organisational members and augmented their ability to complete project tasks (Han et al., 2016). A study conducted in the South African study measured a similar relationship using an EnergyScapes profile (Derman et al., 2011). Numerous other studies had been conducted using different theoretical models to measure behavioural energy or state and its impact on project success (Ahmed et al., 2014; Bayiley & Teklu, 2016; Martens et al., 2018). It was pertinent to understand whether the physical and behavioural state of an employees and work teams had an impact on project success, but no study had directly measured the relationship between the behavioural dimension, as per the PEM instrument, and project success, hence the hypothesis was formed.

3.3.1.3. Research question 1c: Cognitive dimension

Research question one (RQ1c): Can it be predicted with reasonable accuracy that a relationship exists between the cognitive dimension (CD) and project success (PS)?

- **Null hypothesis one ($H_0$1c):** No significant relationship exists between the cognitive dimension (CD) and project success (PS).
- **Alternate hypothesis one ($H_1$1c):** A significant relationship exists between the cognitive dimension (CD) and project success (PS).

Two South African studies, organisational energy was measured using two different scales, namely the EnergyScapes profile and Productive Energy Measure scale. Both scales ascertained that cognitive energy has an impact on organisational outcomes and performance. Multiple research studies have also reported that intellectual and cognitive ability promote positive project outcomes (Alexiou et al., 2018; Chen et al., 2016; Russo et al., 2015). It was pertinent to understand whether the cognitive energy of employees and work teams has an impact on project success, but no study had directly measured the relationship between the cognitive dimension, as per the PEM instrument, and project success, hence the hypothesis was formed.

3.3.2. Aggregate organisational energy

3.3.2.1. Introduction

A two-tailed hypothesis was used in order to test the hypotheses. The following statistical tests were used to determine the extent of the association between the independent and dependent variables.

The simple linear regression model is defined in Equation 2:

Equation 2: Simple linear regression for organisational energy and impact on project success (RQ2)

$\mathbf{Yi = ß_0 + ß_1X_1 + \varepsilon_i}$ R. Wegner (2014)

Null hypothesis: H_0: $ß_1 = 0$

Alternative hypothesis: H_0: $ß_1 \neq 0$

The variables defined for the simple linear regression are as follows:

- **Independent variable** – Organisational energy
- **Dependent variable** – Project success

3.3.2.2. Research question 2: Organisational energy

Research question one (RQ2): Can it be predicted with reasonable accuracy that a relationship exists between organisational energy (OE) and project success (PS)?

- **Null hypothesis one ($H_0$2):** No significant relationship exists between organisational energy (OE) and project success (PS).
- **Alternate hypothesis one ($H_1$2):** A significant relationship exists between organisational energy (OE) and project success (PS).

Multiple research studies have illustrated that organisational energy has a positive impact on organisational success (Cole et al., 2008; Cuff & Barkhuizen, 2014; Derman et al., 2011; Tosey & Llewellyn, 2002). It was pertinent to understand whether organisational energy of employees and work teams had an impact on project success and to date, no study had directly measured the relationship between organisational energy, as per the PEM instrument, and project success, hence the hypothesis was formed.

3.4. Conclusion

Multiple hypotheses were identified to assess the relationship between organisational energy and project success.

4. RESEARCH METHODOLOGY

4.1. Research design

The primary objective of the research methodology was to validate the relationship between organisational energy, its latent variables, and project success. A positivist philosophy was adopted because of the likelihood to observe and describe reality from an objective viewpoint (Swanson & Holton, 2005). The research approach adopted was a deductive approach by determining hypotheses from the theoretical foundation outlined in Chapter 2.

Quantitative methods were used to determine the relationship between variables using hypothesis testing without inferring causality (Saunders et al., 2016). Statistical methods can be used to foresee and elucidate relationships between variables. The primary advantage of quantitative research is that through the analysis of larger samples, results can be generated that are generalisable to the population (Swanson & Holton, 2005). This study employed the mono-method as it primarily involved the use of surveys in the form of standardised questionnaires with Likert scales to collect data (Saunders et al., 2016).

Survey instruments allow for the collection of large, reliable and rich data, and are cost-effective. A cross-sectional study was utilised as it provides a snapshot of data gathered, and given the research timeframe, it was impractical to attempt a longitudinal study (Saunders et al., 2016).

4.2. Population

The population was classified as the total number of group members who share a common characteristic (Creswell, 2012; Saunders et al., 2016; Zikmund, Babin, Carr, & Griffin, 2010), and can be divided into the general, target, and accessible population within a quantitative study (Asiamah, 2017). The general population is the largest group of respondents that can partake in the study, with the respondents in this group sharing a mutual feature.

The general population for this research study was all employees within organisations that conduct projects. The target population is regarded as a further refinement of the general population, i.e. it is a group of respondents with a specific feature of significance to the study (Creswell, 2012). The target population was all employees involved in projects in the mining, oil and gas, manufacturing, information technology, financial, automotive, construction, medical and healthcare, education and consulting sectors.

The accessible population is all the respondents within the target population who take part in the study (Bartlett, Kotrlik, & Higgins, 2001). The accessible population in this research project was all employees involved in capital and infrastructure, information technology, process re-engineering and improvement projects in the mining, information technology, financial, automotive, construction, medical and healthcare, education, and consulting sectors in South Africa.

The surveyed employees were chosen from a variety of project forms and roles to ensure representativity across different project ecosystems, professions and functional disciplines. As this research project aimed to generalise its findings to different project types, it was pertinent to ensure that a diverse group of respondents from various project types and environments were chosen to reduce any bias that may have come from a specific project environment.

The final sample frame was regarded as employees within organisations that were involved in projects. The large numbers of industries and organisations that conduct projects and the choice to not allow for restrictions on the types of projects allowed for the necessary diversity and scale to conduct a meaningful statistical analysis.

4.3. Sampling method and size

To produce findings that are representative of the entire population, sampling must be employed. Sampling can be employed at a lower price than trying to survey the entire population (Schwandt, 2007). It is not cost-effective and realistic to obtain data from an entire sample, and hence sampling is employed to obtain a portion of the broader population. The complete list of individuals within the population was not known, and hence it was not viable to develop a complete sampling frame.

Thus non-probability sampling was more suitable and conducive to conducting this research project. When the target population is unknown it is viable to use non-probability sampling as the likelihood of a member being selected cannot be determined (Saunders et al., 2016). This is in contrast to probability sampling, where the complete population is known, and each participant has an even probability of being selected (Zikmund et al., 2010).

The techniques of convenience and snowball non-probability sampling were used for this study to select individuals who were involved in projects across multiple industries within the South African context. Snowball sampling allows designated respondents to identify additional respondents who meet the requirements of the population, and the capacity to respond to the questionnaire (Saunders et al., 2016). Due to the inability to access some of the sectors personally, the snowball technique was necessary.

To meet the goals of the research project, individuals were selected that would be viable respondents. These individuals were then asked to refer the survey to additional candidates that met the relevant criteria. Both the participants selected and the participants who were referred met the target population criteria of the study. It was anticipated that all participants would provide responses that assisted in achieving the research objectives.

To diminish sampling error, the surveys were distributed electronically via Google Forms to gather data across multiple organisations and project types. In order to minimise non-response errors, surveys were distributed to participants multiple times, and settings on Google Forms were enabled that forced participants to complete all the questions in the survey. This technique improved response rates and reduced incomplete surveys.

The highest possible sample size should be achieved to ensure that results can be generalisable to the wider population (Hertzog & Boomsma, 2009). In exploratory research a sample size of 100 is satisfactory to utilise the required statistical techniques (Knofczynski & Mundfrom, 2007), however, owing to the fact that factor analysis a statistical test conducted in the research project, the sample size had to be substantially increased to ensure that statistical stability was achieved.

Two factors were considered, to ascertain the minimum sample size, for factor analysis, the subject-to-variables (STV) ratio and the absolute number of cases. STV ratios are an indication of the smallest number of samples needed per item in the measurement instrument (MacCullum, Widaman, Zhang, & Hong, 1999). Gorsuch (1983) advised that five samples per item was adequate to conduct factor analysis with a minimum of 100 samples, while Bryant and Yarnold (1995) established that no less than five samples per item is acceptable. The measurement instruments in the study contained a total of 26 items, with PEM containing 14 items and PSQ containing 12 items. This translated to a minimum sample of 130 samples as formulated by the STV ratio methodology. However, Tabachnik and Fidell (2001) postulated that a minimum of 300 samples is required to conduct factor analysis or structural equation modelling.

This outcome was reinforced by Comrey and Lee (1992), yet Hutchson and Sofronious (1999) argued that 150 cases are a feasible sample size when the number of highly correlated variables is low, and 300 cases are viable when highly multicollinear variables are present. Taking into consideration the discussion around STV and an absolute number of cases, a sample size of at least 150 to 300 was regarded as appropriate for factor analysis. The final sample contained 250 cases, which resulted in a STV of approximately 9.

4.4. Unit of analysis

The unit of analysis was the persons or objects under study (Saunders et al., 2016), which in this case were project employees and projects. This study focused on projects conducted in South African organisations.

4.5. Data collection process

Creswell (2014) stated that various data collection methods are possible with quantitative studies, including non-experimental methods such as surveys, experimental and quasi-experimental methods. The survey approach was utilised in the research project as it is regarded as an appropriate data-collection instrument for deductive research. Survey studies obtain data from a large population, they are cost-effective, and they allow for ease of comparison (Saunders et al., 2016). The survey instrument was disseminated via an online platform called Google Forms and was utilised to obtain data, more specifically primary data.

The benefit of using survey instruments is that it can be circulated to multiple geographical locations and has a quick turnaround time. Respondents who would like to understand and assess the questions before providing their responses are also provided with the chance to work through the survey and remain anonymous, which allows for more honest feedback (Zikmund et al., 2010). Problems that could be experienced when using the survey method include misunderstanding or misinterpreting questions, low response rates, and ineffective answering of questions (Becker, Bryman, & Ferguson, 2012; Patricia & Murphy, 2016).

Both the PEM and the PSQ questionnaire came from peer-reviewed scholarly journals, and multiple validation studies had been conducted on them, which reduced the likelihood of misinterpretation of the questions. However, the risk still remained that respondents may misinterpret the questions, which could result in unreliable responses.

The major concern with quantitative research projects based on survey instruments are low response rates and unreliable data (Saunders et al., 2016). A major concern was that the respondents were professional employees who had demanding schedules. To improve the number of responses, potential respondents were sent the survey questionnaires well in advance, as were individualised personal emails. Email reminders were distributed bi-weekly to improve response rate.

The project management environment is regarded as fast-paced and project managers face multiple time constraints. To this end, it was envisaged that the response rates might be low due to the demanding timeframe of the research project. To reduce time pressure on the survey participants, shorter measurement scales were used. Multiple measures were put in place in the attempt to improve the sample size.

4.6. Measurement instruments

The two measurement instruments employed the Likert scale to measure the dependent and independent variables on an ordinal scale. Non-parametric tests can be conducted with ordinal scale data (Black, 2010; Mircioiu, 2017), however parametric testing has more statistical testing power, and larger samples sizes are needed to improve statistical power. If data is normally distributed, and adequate sample sizes are achieved, the use of ordinal data is permissible (Mircioiu, 2017; Sullivan & Artino, 2013; Zikmund et al., 2010). The prerequisites of parametric tests with interval scale data were achieved. Normality of data is addressed in the next chapter.

The most frequently used scale in survey questionnaires is the Likert scale. Coefficient alpha reliability tests of Likert scales have improved when using a five-point Likert scale, and the literature endorses five and seven-point Likert scales (Swanson & Holton, 2005). The Productive Energy Measure (PEM) used a five-point Likert scale, while the Project Success Questionnaire (PSQ) used a seven-point Likert scale.

The survey instrument requested demographic information related to age, gender, race, industry type, job title, project experience and project types on which the respondents worked. Two measurement scales were included in the survey questionnaire that was related to the constructs in the research question. The shortest varieties of the measurement instruments were used, as the shortened questionnaires had proven validity and reliability in academic literature.

Reliability testing of the measurement scales using Cronbach’s alpha is highly sensitive to the quantum of items in a scale. Low Cronbach’s alpha score are achieved with scales with lower number of items (Pallant, 2005). To ensure good reliability of the measurement scale, it was thus crucial that the researcher consider the number of items in the the selected scales when examining the Cronbach’s alpha values (Hair, Black, Babin, & Anderson, 2010).

The items in the measurement instruments and level of scoring are presented in the appendices. The subsections below provide an indication of the scales that were used in the study and the justification for their use. Ethical clearance was established preceding the distribution of the surveys.

4.6.1. Productive Energy Measure instrument

The Productive Energy Measure (PEM) was used to measure organisational energy at the aggregated level (independent variable), as well as latent variables of organisational energy, namely the affective dimension, behavioural dimension and cognitive dimension (independent variables) (Cole et al., 2012).

The PEM was developed to measure organisational energy levels according to the individuals in an organisation (Cole et al., 2005). PEM scores are aggregated by integrating the scores of the affective, behavioural and cognitive dimensions. Literature indicates that three research studies have been executed to confirm the use of PEM, which has been validated in various multinational organisations around the world, including Switzerland, France, Sweden, the UK and the USA (Cole et al., 2005).

An Exploratory Factor Analysis (EFA) was performed during the first study by Cole et al. (2005), which established a three-factor model that described 57% of the variance explained. During the same study, all questions or items that had factor loadings less than .40 were removed. The removal of these variables resulted in a 14 item PEM. During the first and second studies, a Confirmatory Factor Analysis (CFA) was conducted that specified that a three-factor model was a suitable fit (Cole et al., 2012).

The measuring instrument thus consisted of 14 items, comprised of five items for the affective dimension, four items for the behavioural dimension, and five items for the cognitive dimension. PEM was used to determine whether an association exists between organisational energy, its latent variables and project success. Validity and reliability of the constructs were tested using exploratory factor analysis and confirmatory factor analysis.

4.6.2. Project success questionnaire instrument

The measurement instrument utilised to obtain information and data on project success was a survey instrument that was aligned with the original project implementation profile (PIP) (Pinto & Slevin, 1988). The PIP used a theory for project success that comprised of two overarching components, namely the project and the client dimensions (Muller & Jugdev, 2012). Pinto and Slevin (1988) are regarded as the foremost authorities on project success research, as they have enabled organisations to measure the success of their projects by applying the PIP instrument (Muller & Jugdev, 2012).

The questionnaire in this research evaluated hard criteria for project success, which included schedule, time and budget criteria, and soft criteria, including client measures, use of project, and impact on the organisation criteria (Pinto & Slevin, 2006).

The Project Success Questionnaire (PSQ) was appropriate for this study due to the fact that project success could be measured using the instrument (Pinto & Slevin, 1988). In a previous study, a Cronbach’s alpha coefficient of .81 was achieved, which indicated acceptable reliability. The upside to the PSQ questionnaire is that project success can be evaluated during a project’s lifecycle to determine areas that require attention (Finch, 2003).

One of the most important reasons why researchers switched from the PSQ to Pinto and Slevin’s (2006) PIP was recommended by Muller and Jugdev (2012) on PSQ, when they determined through cooperation and collective understanding between similar studies and publications that PSQ provides a solid platform for the evaluation of project success (Muller & Jugdev, 2012). The PSQ questionnaire was utilised to ascertain whether a relationship exists between multiple organisational energies and if their factors impact project success. The section above provided insights into the methodology, design and measurement instrument, while the proceeding section will outline the data analysis steps.

4.7. Data analysis

4.7.1. Introduction

The data analysis methods and techniques employed during the study have been articulated in this chapter. The data analysis was performed using IBM SPSS (version 25). The data analysis was conducted in three defined and distinct stages. Firstly a preliminary analysis was conducted. Secondly structural equation modelling was performed, and lastly, a regression analysis was conducted. Further discussion on each step is provided thereafter. Table 2 indicates the data preparation, descriptive statistics and exploratory factors steps that were conducted.

Table 2: Preliminary data analysis steps

Steps	Description	Purpose	Methodology
Preliminary analysis: Data preparation, descriptive statistics and exploratory factor analysis			
Data preparation	Data editing	• Remove outliers and missing data points	• Mahalanobis distance
	Assumption testing	• Establish whether data meets assumptions for factor analysis and regression analysis	• Normality • Outliers • Linearity • Factorability • Sample size • Multicollinearity
Descriptive statistics	Descriptive statisitics	• Relevant descriptives	• Frequency • Percentage
Exploratory factor analysis	Principal Component Analysis (PCA)	• Appropriateness of data for factor analysis	• Kaiser – Meyer – Olkin • Bartlett's test of Sphericity
		• Determine number of factors to analyse	• Kaiser Eigenvalues • Cattells Scree plot
		• Confirm the existence of factors	• Principle component analysis (PCA) • Orthogonal rotation (Varimax)
	Reliability of scales	• Confirm reliability of scales used	• Cronbach's alpha

Source: Author's own research

Table 3 indicates the structural equation modelling steps including measurement and structural model development.

Table 3: Structural equation modelling steps

Steps	Description	Purpose	Methodology
Structural Equation Modelling: Analyse the relationship between constructs			
Measurement model	Factor analysis	• Determine which variables load onto which constructs from the instrument scales	• Confirmatory factor analysis (CFA) • Factor loading • Correlation estimates
	Validity of scales	• Confirm validity of scales used	• Convergent validity (AVE) • Discriminant validity (MSV) • Nomological validity (NV)
	Reliability of scales	• Confirm reliability of scales used	• Composite Reliability Coefficient
	Model fit analysis	• Confirm measurement model fits the data	• Range of model fit indices
Structural model	Factor analysis	• Determine which variables load onto which constructs from the instrument scales	• Confirmatory factor analysis (CFA) • Factor loadings • Correlation estimates
	Validity of scales	• Confirm validity of scales used	• Convergent validity (AVE) • Discriminant validity (MSV) • Nomological validity (NV)
	Reliability of scales	• Confirm reliability of scales used	• Composite Reliability Coefficient
	Model fit analysis	• Confirm structural model fits the data	• Ranges of model fit indices

Source: Author's own research

Table 4 indicates the steps that were followed to conduct the regression analysis.

Table 4: Regression analysis steps

Steps	Description	Purpose	Methodology
Regression analysis: Determine the nature of relationship between constructs			
Correlation analysis	Correlation between organisational energy, latent variables and project success	• Degree and magnitude of relationships	• Pearson's r correlation
Multiple regression analysis	Hypothesis testing	• Determine how well regression model fits the data	• Model summary – R, R^2, adjusted R^2 • Multiple correlation coefficient – quality of prediction • Coefficient of determination – variance explained
	Statistical significance	• Determine whether independent variables statistically predict the dependent variable	• F-ratio and p-value in ANOVA table
	Estimate model coefficients	• Develop prediction equation and determine significance of independent variables	• Unstandardised coefficients

Source: Author's own research

Table 5 represents the acronyms used in the study:

Table 5: Data labels

Acronym	Construct
AD	Affective dimension
BD	Behavioural dimension
CD	Cognitive dimension
OE	Organisational energy
PS	Project success

Source: Author's own research

Table 6 provides an overview of the constructs that will be measured and the research question.

Table 6: Constructs and their research questions

Acronym	Independent (predictor) variable	Dependent (outcome) variable
Objective 1	Affective dimension	Project success
Objective 2	Behavioural dimension	Project success
Objective 3	Cognitive dimension	Project success
Objective 4	Organisational energy	Project success

Source: Author's own research

4.7.2. Preliminary analysis

A total sample size of 250 responses was obtained, which were compiled into a single Microsoft Excel flat file. When conducting quantitative data analysis, a three-step process is usually followed which includes data editing, coding and statistical analysis.

4.7.2.1. Data preparation

Data editing

Data editing refers to the editing or cleaning of data to address any discrepancies in the data. These discrepancies included outliers, out-of-range values, and typographical errors. By correcting these errors, the quality of the data for statistical analysis improves (Wegner T., 2016). Due to the controls that were put in place for the electronic survey, it was unlikely that typographical, out-of-range and missing value errors could occur, however, outliers were expected. As stated, no missing values were found in the dataset.

Outliers are regarded as data points that do not mimic the overall character of the dataset (Zikmund et al., 2010). The initial step in the statistical analysis was to detect outliers and eliminate them accordingly. The Mahalanobis Z – score and distance were used to identify outliers in the dataset. The Mahalanobis testing technique can be utilised for studies that contain data with multiple independent variables (Ekiz & Ekiz, 2017).

This test quantifies the distance of an observation from the mean, and if the distance between the case and mean is significantly large, it is regarded as an outlier. The Mahalanobis distance is conducted for each multivariate observation and changed to an applicable p-value with the utilisation of chi-squared distribution and the degrees of freedom, which are regarded as the number of variables (Ekiz & Ekiz, 2017). P-values are then depicted for each observation. Using the number of items or questions in the two measurement scales, the degrees of freedom were determined which ultimately assisted in determining the critical chi-square value (Pallant, 2005).

To determine whether a case or observation is an outlier will be determined by the alternate hypothesis (Ekiz & Ekiz, 2017; Hair et al., 2010). The acceptance or rejection criteria are as follows.

- Fail to reject the null hypothesis when the p-value is greater than or equal to α=.01 (Hair et al., 2010), and conclude that the observation is not an outlier to a 99% confidence level;
- Reject the null hypothesis when the p-value is less than α=.01, and conclude that the observation is an outlier beyond a 99% confidence level (Ekiz & Ekiz, 2017; Hair et al., 2010).

To determine the outliers for the dataset the Mahalanobis distance was computed using IBM SPSS (version 25). This was achieved by regressing the variables in the dataset against a chi-squared distributed random variable. The statistic was compared to the chi-squared test-critical at α=.001 where the degrees of freedom were the total number of independent variables (Ekiz & Ekiz, 2017; Hair et al., 2010). A total of 16 outliers were found and removed from the dataset.

The Mahalanobis method is problematic when trying to identify outliers with sample sizes smaller than 20 (Ekiz & Ekiz, 2017). However, the research project performed achieved a sample size of 250 which meant that the Mahalanobis method would be an appropriate technique for removing outliers.

Data from the participants were collated using Google Forms. A flat file that displayed the responses to each question was generated in Excel. The Excel table was summarised, and all the questions from the two scales were given distinctive three letter codes, i.e. PEM1, PEM2 and PSQ1 and so forth. Demographic variables including gender, race, industry type, job title, and project type were coded as nominal-scale categorical data so that descriptive statistical testing could be conducted. Likert scales were used for responses to the PEM, and PSQ scales and these scales were coded as numeric data with ordinal properties. Frequency tables were generated and examined to ensure that unfair representations that could potentially create bias were not present in the dataset. The dataset was then further analysed in SPSS.

Assumption testing

The following assumptions were met in order to conduct factor analysis and multiple regression analysis. These include:

- **Normality** – Multivariate and univariate normality must exist in the dataset in order to conduct factor analysis (Yong & Pearce, 2013; Field, 2013). Normal distribution was tested by examining kurtosis and skewness in the dataset using SPSS. Hair et al. (2010) suggested that data is considered to be normally distributed when its skewness is between -2.58 and +2.58 and if its kurtosis is between -7 and +7 (Awang, 2014).
- **Outliers** – Factor and regression analysis are sensitive to outliers with high and low scores (Pallant, 2005). For this reason, univariate and multivariate outliers must be removed from the dataset before analysis can be conducted. The

Mahalanobis distance and the critical chi-square statistics were used to remove outliers. The degrees of freedom were ascertained by utilising the number of questions or items in the measurement instrument, thereafter, the critical chi-square value could be determined (Pallant, 2005). Using the Mahalanobis method, 16 outliers were removed from the dataset.

- **Linearity** – Linear relationships must exist between the factors and variables measured using correlations (Wegner R., 2014). Linearity denotes the constant slope of change that represents the independent variables and dependent variable relationship. If this relationship is inconsistent, then the SEM analysis will be inaccurate (Wegner T., 2016). Visual inspection can be used to determine whether residual scatterplots of each dependent and independent variable relationship is linear (Hair et al., 2010). Curve estimation was used in SPSS to ascertain whether linearity existed between predicator and outcome variables.
- **Factorability** – A factor should contain at least three variables (Comrey & Lee, 1992). The Kaiser-Meyer-Olkin (KMO) test and Bartletts' test of sphericity provide insight into whether factorability has been achieved. The criteria for factorability included (KMO>.6) and a significant Bartletts' test ($p<.05$) (Pallant, 2011).
- **Sample size** – Each variable must contain a minimum of 5 to 10 observations per item to conduct factor analysis (Comrey & Lee, 1992). A minimum number of absolute observations for factor analysis is 150 to 300 (Hutcheson & Sofroniou, 1999), however, to conduct regression analysis with four predictor variables a minimum of 150 cases is required (Anderson et al., 2017).
- **Multicollinearity** – The existence of multicollinearity is not appropriate for factor analysis, and multicollinearity exists when high correlation coefficients are present among the independent variables. To test for multicollinearity, the Variance Inflation Factor (VIF) were studied. To perform a factor and regression analysis on the dataset, a VIF<10 had to be achieved to indicate the absence of multicollinearity (Hair et al., 2010; Field, 2013).

4.7.2.2. Descriptive statistics

Descriptive statistics contextualise data in a simple and straightforward manner that generates insights into the variability and central tendency of the data (Creswell, 2012). Descriptive statistical testing was conducted to describe and organise variables for presentation and were conducted on the dataset. The following statistics were calculated for each observable question: mean, minimum, maximum, standard deviation, skewness and kurtosis. The biographical data was used as simple descriptive statistics.

4.7.2.3. Exploratory Factor Analysis

Introduction

Observable variables are able to be condensed to less unobserved variables that contain a mutual variance and characteristics using factor analysis, also known as factor reduction (Bartholomew, Knotts, & Moustaki, 2011). To denote these variables, hypothetical constructs are used (Cattell, 1973). Surface and internal attributes are regarded as dependent and primary factors respectively. These common factors are regarded as factors that have the ability to impact two or more observed variables, while specific factors only impact a particular observed variable (Yong & Pearce, 2013).

To group variables into factors a statistical test namely Exploratory Factor Analysis (EFA) was conducted. The objective of the EFA method is to reduce the amount of constructs that account for total variance and correlations (Yong & Pearce, 2013). The data collected for the research project was based on a theoretical model from academic literature and as such the EFA method was regarded as an appropriate method for factor reduction (Hair et al., 2010). The EFA method provided insights into the underlying factor structure of the dataset and whether it loaded onto similar factors as observed in the academic literature.

There are three steps to an EFA, which include suitability of data, factor extraction and factor rotation and interpretation (Pallant, 2011). The EFA steps are described in Table 7.

Table 7: EFA steps

EFA steps	Method	Thresholds/Ranges
Suitability of data Determine whether data are appropriate for exploratory factor analysis	• **Kaiser-Meyer-Olkin (KMO)** Indicator of sampling adequacy • **Bartlett's Test of Sphericity** Significance allows for continuation of factor analysis	• Above .6 (Pallant, 2011) • Significant (p<.05)

Factor extraction
 	
Assists in determining the lowest number of factors that best characterise the interrelationships of the variables
	• **Principal Component Analysis (PCA)**
	  • **Kaiser's criterion**
	  Assists in determining number of factors
	  • **Total variance explained**
	  Measure the total variance explained
		• Eigenvalue > 1
		
		Kaiser's criterion stipulates that factors will be retained.

Factor rotation and interpretation
 	
Components that maximise the variance explained are extracted
	• **Principal Component Analysis (PCA)**
	  • **Varimax orthogonal rotation**
	  Assists in the minimisation of variables that have high factor loadings.
		• Factor loading >.5
		
		Items are associated with factor which have the highest loading.

Source: Hair et al. (2010); Pallant (2011)

After the completion of the preliminary analysis, the next step of the analysis was performed, which was Structural Equation Modelling (SEM). This was performed using the dataset to determine and confirm the underlying factor structure (Babin & Svensson, 2012; Hair et al., 2010).

4.7.3. Structural Equation Modelling

4.7.3.1. Introduction

To test the research hypothesis, SEM and regression analyses were used as statistical tests to analyse the dataset. SEM is regarded as a multivariate technique that estimates that relationship between multiple independent and dependent variables through an equation estimation process (Babin & Svensson, 2012).

SEM was utilised as it is the most widely used tool to define how well the suggested factors fit the datasets. New insights into existing theories can be obtained from this form of testing (Babin & Svensson, 2012; Hair et al., 2010).

The hypotheses developed by the researched have defined independent and dependent variables that require dependence statistical analytical techniques to ascertain the extent of the association among the variables. SEM is regarded as a dependence method (Babin & Svensson, 2012; Schumacher & Lomax, 2004; Zikmund et al., 2010) that can be utilised to ascertain the relationship between factors and the theoretical models that underpin these constructs (Babin & Svensson, 2012). SEM has multiple advantages, including the ability to factor in measurement error, it is more powerful than multiple regression analysis, and the results are more easily interpreted (Hoyle, 2014; Schumacher & Lomax, 2010).

4.7.3.2. *Structural equation modelling steps*

Structural equation modelling was conducted using eight steps (Awang, 2014; Hair et al., 2010). The steps have been split into the measurement and structural model analysis steps. The measurement model steps are depicted in Table 8.

Table 8: Measurement model steps

SEM steps	Method	Thresholds/Ranges
Define the constructs	Conduct academic literature review and develop conceptual and theoretical models	N/A
Development of measurement model	Use the conceptual model and the measurement scales	N/A
Determine the measurement model reliability and validity	• **Convergent Validity (AVE)** • **Discriminant Validity (MSV)** • **Nomological Validity (NV)** • **Reliability (CR)** Assess whether factors demonstrate adequate reliability and validity before moving onto the structural model	• **AVE > .50** • **MSV > AVE** • **CR > .70** • **NV = Correlations must make theoretical sense**
Evaluate the model fit indices of the measurement model	• **Chi-square/ degrees of freedom (cmin/df)** • **Goodness of fit index (GFI)** • **Tucker Lewis index (TLI)** • **Comparative fit index (CFI)** • **Root mean square error of approximation (RMSEA)** Determine and refine the measurement model using model fit indices	Thresholds to be discussed in SEM output section

Source: Awang (2014); Hair et al. (2010)

The structural model steps are depicted in Table 9.

Table 9: Structural model steps

SEM steps	Method	Thresholds/Ranges
Development of the structural model	Convert measurement model to structural model	N/A
Determine the structural model validity	• **Convergent Validity (AVE)** • **Discriminant Validity (MSV)** • **Nomological Validity (NV)** • **Reliability (CR)** Determine whether factors demonstrate adequate reliability and validity before moving onto the regression analysis	• **AVE > .50** • **MSV > AVE** • **CR > .70** • **NM = Correlations must make theoretical sense**
Evaluate the model fit indices of the structural model	• **Chi-square/ degrees of freedom (cmin/df)** • **Goodness of fit index (GFI)** • **Tucker Lewis index (TLI)** • **Comparative fit index (CFI)** • **Root mean square error of approximation (RMSEA)** Determine and refine the structural model using model fit indices	• Thresholds to be discussed in SEM output section

Source: Awang (2014); Hair et al. (2010)

It is evident from the steps articulated above that two clear sub-models are described, the measurement model and the structural model. The measurement model describes the common factor model and its factor loading, while the structural model defines the regression weights, and variance explained of the relationships (Hair et al., 2010). In the sections that follow these models and their stepwise process for analysis will be described.

4.7.3.3. Structural equation modelling output

Commalities in the SEM output exist between the measurement and structural model. These commalities include the graphical output, correlation estimates and the model fit indices. The outputs will be described below.

Structural equation modelling graphical output

The models are displayed graphically, and the graphic elements have been described below:

- Observed variables are displayed as squares or rectangles.
- Unobserved variables are displayed as circles or ellipses.
- Regression weights are displayed as single arrowhead lines.
- Covariances or correlations are displayed as double arrowhead curved lines.
- Measurement errors are displayed as smaller ellipses.

Correlation estimates

The correlation estimates of each relationship are displayed as double arrowheads as explained above. These arrowheads represent the covariance between two variables and are regarded as the regression coefficients of each relationship (Awang, 2014; Hair et al., 2010). The graphical output displays the correlation between factors and their relative strength, and the significance is displayed in the matrix output.

Model fit indices

Model fit determines the degree of model fit between the suggested model and associations among various factors in the dataset. A good fit is when all the major associations are displayed in the dataset; if this is not achieved then there is an inconsistency among the associations suggested, and the associations detected, and an inadequate model fit is observed (Awang, 2014; Hoyle, 2014). The measurement and structural models were assessed for model fit, using specific model fit criteria. A model is regarded as acceptable when a goodness of fit is recognised (Hair et al., 2010). The standard indices that are reported by most academic literature and their relevant thresholds are reported below.

Table 10: Model fit indices and thresholds

Fit index	**Criteria used in this study**	**Hair et al. (2010)** (12<*m<30)	**Schreiber et al. (2006)** (12<*m<30)	**Hu and Bentler. (1999)** (12<*m<30)
Chi – square/df	• Cmin/df≤2 depicts good fit • 2≥Cmin/df≤5 depicts an acceptable fit	• Cmin/df≤2 depicts good fit • 2≥Cmin/df≤5 depicts an acceptable fit	2≥Cmin/df≤3 depicts good fit	-
GFI	• Above .90 good • Above .80 acceptable	• Above .90 good • Above .80 acceptable	Above.90	Above .95
TLI	• Above .90 good • Above .80 acceptable	• Above .90 good • Above .80 acceptable	.95≤TLI≤1.00	Above .95
CFI	• Above .90 good • Above .80 acceptable	• Above .90 good • Above .80 acceptable	.95≤CFI≤1.00	Above .95
RMSEA	• < .05 good • .05 to 1.0 moderate	• < .05 good • .05 to 1.0 moderate	< .06	< .06

Note: *m = number of observed variables

Source: Hair et al. (2010), Hu and Bentler (1999), Schreiber, Stage, King, Nora, & Barlow (2006)

It was decided that more stringent model fit criteria should be utilised as proposed by Hair et al. (2010) as this would ensure that the proposed model fits the dataset more precisely and that associations among the various factors would be well described.

4.7.3.4. Structural equation modelling – Measurement model

Factor analysis

During SEM, the measurement model assists in relating the measured variables to the latent variables. SEM is a confirmatory method for validating the SEM measurement model of unobserved factors. Confirmatory Factor Analysis (CFA) is the validation procedure in SEM (Awang, 2014). The process of performing a CFA is regarded as a far more complex analysis technique than EFA (Pallant, 2011). Once the number of factors and items are known, a CFA analysis of this measurement model can be performed (Hair et al., 2010).

The results from the EFA were used to specify the factors and item loadings. CFA assisted in ascertaining the factor loading estimate and ultimately the measurement contribution of each observed variable (Awang, 2014; Hair et al., 2010). The relationship of each latent variable and its observed variable is articulated as a factor loading. These factor loadings can simply be regarded as standardised regression coefficients. CFA indicates how strongly correlated constructs are with each other (Awang, 2014). It is imperative that factor loadings are .50 and higher and they must be statistically significant. Correlation estimates must be below .70 and statistically significant (Hair et al., 2010).

Validity

Validity is regarded as the ability of a measurement scale and its related specific unobserved factors, and whether the variables are being measured correctly (Awang, 2014). To determine validity, factor analysis is utilised (Creswell, 2012).

Construct validity is utilised to quantify whether a factor is quantifying the correct factor, and is determined by examining whether a construct is related (convergent validity) or unrelated (discriminant validity) to other constructs (Pallant, 2011). Convergent and discriminant validity are regarded as sub-categories of construct validity; when convergent and discriminant validity are demonstrated then by definition construct validity is assumed (Awang, 2014). Convergent and discriminant validity are further explained below:

- **Convergent Validity: Average Variance Extracted (AVE) –** Convergent validity is attained when statistical significance is achieved in the measurement and structural model. Convergent validity can be determined by computing AVE for each factor. To achieve validity, the AVE should be 0.50 or higher. Retaining low factor loadings items in a model can result in a failure to achieve convergent validity (Awang, 2014).
- **Discriminant Validity: Maximum Shared Squared Variance (MSV) –** Discriminant validity determines whether the measurement and structural model are free from redundant items. The AMOS software identifies item redundancy in the model using Modification Indices (MI); the higher the MI values, the higher the redundancy of the respective items. Associations between constructs may not exceed .85 for discriminant validity to be achieved, as a high association is an indicator that the constructs are redundant or have multicollinearity issues. MSV is a measure of discriminant validity which is calculated using the maximum share variance of a construct and squaring that value (Hair et al., 2010). The MSV value for a factor should be lower than the AVE value for the same construct to determine if discriminant validity has been achieved (Hair et al., 2010). When the MSV value is higher than the AVE value for a specific construct, an extra step is required in the process. This step relates the square root of the AVE value with its corresponding association or correlation values (Hair et al., 2010).
- **Nomological Validity (NV)** - To determine whether nomological validity was achieved, the correlations between components in the model must be significant and make theoretical sense (Hair et al., 2010). To assess nomological validity a matrix of the correlation coefficients between constructs is valuable (Hair et al., 2010).

Reliability tests are performed once validity is confirmed.

Reliability

Reliability is distinguished in multiple ways, including the degree of reliability of the measurement and structural model in measuring the latent variable; produce consistent findings (Awang, 2014; Saunders et al., 2016) and a measure of internal consistency (Zikmund et al., 2010). Cronbach's alpha coefficient used in the EFA and the Composite Reliability (CR) Coefficient used in the SEM were used to assess reliability in the study:

- **Cronbach's Alpha Coefficient (*α*)** – provides an indication of internal consistency or reliability and provides insights into the strength of the measuring items and their ability to hold together in the factor. This reliability coefficient ranges from 0 to 1, with 1 indicating high consistency. When α>.70 then good reliability and internal consistency is achieved (Awang, 2014; Hair et al., 2010). Contrary to this research, Zikmund et al. (2010) reported that α<.60 result in poor reliability and α>.80 depict good reliability.
- **Composite Reliability (CR) Coefficient** – this coefficient provides a measure of internal consistency and reliability of an unobserved variable. The Cronbach's alpha coefficient in many cases underestimates the reliability of a construct; the CR is utilised to strengthen the test for reliability (Peterson & Kim, 2013). According to Awang (2014), good reliability is achieved when CR>.60, while Hair et al. (2010) argued that good reliability is achieved when CR>.70.

A summary of the criteria to conduct a SEM measurement model analysis are articulated in Table 11.

Table 11: SEM measurement model steps

Steps	Method		Thresholds/Ranges
Factor analysis	CFA	Factor loadings	• >.50 - acceptable
		Correlation estimates	• >.70 - acceptable
Validity	Convergent validity	AVE	• >.50 - acceptable
	Discriminant validity	MSV	• AVE>MSV
	Correlation and Square root of AVE's matrix		• Square root of AVE>correlation
Reliability	CR Coefficient		• >.70 - good
Model fit analysis	Chi-square/ degrees of freedom (cmin/df)		• < 2.0 - good
	Goodness of fit index (GFI)		• >.90 - good
	Tucker Lewis index (TLI)		• >.90 - good
	Comparative fit index (CFI)		• >.90 - good
	Root mean square error of approximation (RMSEA)		• <.05 - good

Source: Awang (2014), Hair et al. (2010)

The structural model follows once the measurement model is completed and the model is found valid.

4.7.3.5. Structural equation modelling – Structural model

The association between the variables can be determined utilising structural equation modelling, while the measurement model provides insights into the relationship between latent constructs and their variables. The structural model depicts the path estimates, which is regarded as the regression coefficient. This functionality assists in measuring the relationship between the predictor and outcome variable and ultimately test the hypothesis, using path estimates (Hair et al., 2010). The significance and variance explained were also determined in this research project.

4.7.4. Regression analysis

A summary of the steps followed to conduct the regression analysis are articulated in Table 12.

Table 12: Regression analysis steps

Steps	Method	Thresholds/Ranges

Define variables
 	
Define the dependent (DV) and independent variables (IV)
	Variables defined as follows:
	• **Multiple regession (RQ1)**
	  • AD, BD, and CD (IV)
	  • PS (DV)
	• **Linear regression (RQ2)**
	  • OE (IV)
	  • PS (DV)
		N/A

Assumption testing Assumptions to be met before analysis can be conducted	Conducted as per data preparation	N/A
Correlation analysis Measure degree and magnitude of relationship between constructs	• **Pearson's r correlation**	• Range -1 to 1 • -1 – strong negative correlation • 1 – strong positive correlation • 0 – weak correlation

Hypothesis testing Determine the relationship by determining the straight line question	**Multiple (RQ1) and linear (RQ2) regression analysis**	N/A
	• **Multiple correlation coefficient (R)**	• Range 0 to 1 • 0 – no relationship • 1 – perfect relationship
	• **Coefficient of determination (R^2)**	• Range 0 to 1 • 0 - DV cannot be predicted by IV • 1 – DV can be predicted without error by IV

	• **Significance testing**
	  • **P – value**
	  Tests the null hypothesis that the coefficient is equal to zero
		• <.05 – significant
		• >.05 – not significant

	• **Autocorrelation testing**
	  • **Durbin – Watson**
	  Measure of autocorrelation in residuals from regression analysis
		• Range 1.5 to 2.5 – normal
		• Under 1 or over 3 is cause for concern

	• **Estimate model coefficients** Develop prediction equation and determine significance of independent variables	• Using unstandardised coefficients

Source: Field (2013)

4.7.4.1. Defining variables

The following variables were measured in order to conduct the hypothesis tests and to measure the relationship between the independent (predictor) and dependent (outcome) variables.

Research question 1

- **Independent variables** – Affective, behavioural and cognitive dimension
- **Dependent variable** – Project success

Research question 2

- **Independent variables** – Organisational energy
- **Dependent variable** – Project success

4.7.4.2. Assumption testing

Regression analysis is a form of statistical testing that assists in estimating the relationship among variables. In basic terms, regression analysis assists in understanding how the dependent variable is impacted when the independent variable is varied (Field, 2013). Before the analysis could be conducted, a set of assumptions must be achieved. These assumptions were articulated in the data preparation section.

4.7.4.3. Correlation analysis

To quantify the extent of the relationship between factors, a correlation analysis was performed. The specific correlation analysis used was the Pearson's r correlation, which assisted in measuring the association between the predictor and outcome variable (Wegner, 2014). Pearson's r correlation is appropriate for interval scale data (Boone & Boone, 2012). The relationship between the affective dimension, behavioural dimension and cognitive dimension (predictor variables) were measured amongst themselves, while the relationship between the individual independent variables and project success (outcome variable) was also assessed.

Pearson's r correlation coefficient has a range of between -1 and +1. A strong negative relationship is illustrated by a correlation coefficient that is nearer to -1 while a strong positive relationship is illustrated by a correlation coefficient that is nearer to +1. A weak relationship is illustrated by a low correlation coefficient and indicates that the relationship cannot be described by a straight line. A significance level of $p \leq 0.05$ was used for this test.

4.7.4.4. Hypothesis testing

Multiple and simple regression analysis were utilised determine the relationships between the independent variables (predictor variables) and the dependent variable (outcome variable). The reason for conducting a multiple and simple regression analysis was to ascertain the variation explained in the dependent variable by the independent variables. The straight line equation was determined using linear regression analysis (Wegner R., 2014).

The results from the regression were interpreted as follows:

- **Multiple correlation coefficient (R)** is used in multiple regression analysis to ascertain the quality of the prediction of the independent variable on the dependent variable. R has a range of 0 to 1, with a value closer to 1 depicting better predictability of the dependent variable by the independent variable and a value of 0 depicting no predictability of the dependent variable by the independent variable (Wegner T., 2016).
- **Coefficient of determination (R^2)** is utilised in multiple regression analysis to ascertain the variance explained in the outcome variable that is predicted by the predictor variable. R^2 ranges from 0 to 1, all the variance explained by the dependent variable in the independent variable would be illustrated by a value nearer to 1. A value closer to 0 means that no variability is explained in the outcome variable by the predictor variable (Wegner T., 2016).
- **p-value (*p*)** is used to determine whether a relationship is statistically significant. The statistical significance of the overall model and each independent parameter was considered at a 95% confidence interval. The null hypothesis is rejected at $p \leq .05$, and the relationship is regarded as statistically significant and is not rejected at $p > .05$, and the relationship is statistically insignificant.
- **Durbin-Watson (DW)** tests for autocorrelation in a regression analysis. The Durbin-Watson statistic is regarded as a value with a range of 0 to 4. A value of between 1.5 and 2.5 is normal, and no autocorrelation has occurred. Values of $DW<2$ signify positive autocorrelation and values $DW>2$ indicate negative autocorrelation (Field, 2013). Autocorrelation infringes the assumption that instances must be independent (Wegner R., 2014).

The results were interpreted by ascertaining whether a good fit was achieved in the coefficients of the regression model. The adjusted R^2 evaluates variance explained by the relationship between constructs. A three-way analysis of variance (ANOVA) assisted in evaluating the impact of the predictor variables on the outcome variable (Wegner R., 2014)

During hypothesis testing, errors in deduction can occur, i.e. Type 1 and Type 2 errors (Pallant, 2011). Type 1 errors result in the rejection of the null hypothesis when it is, in fact, true, while Type 2 errors result in a failure to reject the null hypothesis when it is in fact false. There were four instances due to the four research questions that could cause a Type 1 or Type 2 error in this study. It is vital that the parametric tests that are performed identify difference within the groups. This is regarded as the power of the tests (Pallant, 2011). There are factors that impact the power of the tests which include sample size; effect size and alpha level (Pallant, 2011). Of vital importance to this research project is sample size. Larger sample sizes which are above 100 cases will improve the power of the test being conducted and negate Type 1 and 2 errors (Pallant, 2011). This research project had a sample size of 250 which increased the power of the testing and reduced the probability of Type 1 and 2 errors.

4.8. Research limitations

Research design and analysis can have multiple limitations, including time frame issues, sampling issues, and data analysis issues (Zikmund et al., 2010). Common limitations that occur in quantitative research include design, data collection and data analysis limitations (Creswell, 2012). Further information on research design and data analysis issues is provided below.

- Cross-sectional studies do not provide the depth of contribution that longitudinal studies do (Wegner R., 2014). The survey instrument was distributed via electronic format thus the participants were unable to ask for clarity and interpretation on the questions. Bias can occur in which respondents answer questions in a positive light instead of honestly (Zikmund et al., 2010).
- The use of non-probability sampling may mean that a fraction of the entire population was chosen to take part in the research project (Zikmund et al., 2010), results were not generalised to the total population. This research project was conducted in South Africa and as such the results cannot be inferred to the global context.
- Structural equation modelling was utilised to ascertain the nature and extent of the relationship between the factors, however, the limitations of SEM are that different researchers can develop different models for the same data or study. Researchers can use different reliability, validity and model fit indices criteria in the evaluation of their SEM model, and different results will be obtained for the same study. This results in inappropriate interpretation (Jeon, 2015).
- Multiple limitations exist in regression analysis, including analysis of variance issues and statistical significance issues. Analysis of variance issues is the

result of inputting more statistically insignificant independent variables, and the R^2 continues to increase, such that the researcher is unable to determine the importance of the independent variable. Statistical significance issues result when the outcome variables are highly correlated with each other. Statistically insignificant outcome variables can be shown to be significant when other variables are removed from the model (Jeon, 2015).

- Due to the fact that events could occur during the research project changes in the independent variable could occur that impacts that dependent variable.
- Due to the fact that the snowballing technique was used, participants who did not fit the specified criteria may have been included, which may render the data invalid. Participants' professions and industry types were screened to ensure that they fit the proposed criteria.

5. RESULTS

Statistical results have been described in Chapter 5. The statistical techniques and method have been executed as per the previous chapter. The research questions articulated in Chapter 3 have been answered as per the statistical analysis. The goal of this research project was to evaluate the relationship between organisational energy, its latent variables, and project success. An interpretation of these results will follow in chapter 6. Table 2 clearly articulates the statistical steps that were followed to conduct the data analysis.

5.1. Preliminary analysis

5.1.1. Data preparation

5.1.1.1. Data editing

Overall response rate to the survey

The data collection process for the survey took two weeks to complete from 8 - 22 June 2018 using Google Forms. Due to controls put in place in Google Forms, all the questions were compulsory. No missing data were observed in the dataset, however, a possible human error was observed for the age variable where one respondent recorded their age as one year old. This point was converted to the average age of 39 years old. The survey was disseminated to 513 individuals, of which a sample size of 250 was achieved against a theoretical sample size of 150. An estimated response rate of 48.7% was achieved.

A Mahalanobis distance test and critical chi-square value were used to remove outliers, which are data points that do not follow the general character of the dataset and can influence the results of the statistical analysis (Cook & Weisberg, 1980). To test for outliers, a Mahalanobis distance test was conducted using the independent and dependent variables in SPSS. The Mahalanobis distance test can also be used to identify multivariate outliers. The test does this by determining the distance a datapoint is from the calculated centre of the other cases, and the centroid is calculated as the intersection of the mean of the variables being assessed (Tabachnick, Fidell, & Osterlind, 2001). Observations where the Mahalanobis distance statistic was greater than the corresponding chi-square critical statistic to a 99% confidence level were identified as outliers and removed from the dataset. A sample size of 234 was achieved by removing 16 outliers from the dataset.

Descriptive statistics were performed on the biographical data within the dataset. A comprehensive set of item descriptive statistics is available in Table 45 within the Appendices.

5.1.1.2. Assumption testing

Introduction

The following assumptions were met in order to conduct factor analysis and multiple regression analysis. These include:

- **Normality** – Multivariate and univariate normality must exist in the dataset in order to conduct factor analysis (Yong & Pearce, 2013; Field, 2013). Normal distribution was tested by examining kurtosis and skewness in the dataset using SPSS. Hair et al. (2010) suggested that data is considered to be normally distributed when its skewness is between -2.58 and +2.58 and if its kurtosis is between -7 and +7 (Awang, 2014).
- **Outliers** – Factor and regression analysis are sensitive to outliers with high and low scores (Pallant, 2005). For this reason, univariate and multivariate outliers must be removed from the dataset before analysis can be conducted. The Mahalanobis distance and the critical chi-square statistics were used to remove outliers. The degrees of freedom were ascertained by utilising the number of questions or items in the measurement instrument, thereafter, the critical chi-square value could be determined (Pallant, 2005). Using the Mahalanobis method, 16 outliers were removed from the dataset.
- **Linearity** – Linear relationships must exist between the factors and variables measured using correlations (Wegner R., 2014). Linearity denotes the constant slope of change that represents the independent variables and dependent variable relationship. If this relationship is inconsistent, then the SEM analysis will be inaccurate (Wegner T., 2016). Visual inspection can be used to determine whether residual scatterplots of each dependent and independent variable relationship is linear (Hair et al., 2010). Curve estimation was used in SPSS to ascertain whether linearity existed between predicator and outcome variables.

- **Factorability –** A factor should contain at least three variables (Comrey & Lee, 1992). The Kaiser-Meyer-Olkin (KMO) test and Bartletts' test of sphericity provide insight into whether factorability has been achieved. The criteria for factorability included (KMO>.6) and a significant Bartletts' test (p<.05) (Pallant, 2011).
- **Sample size –** Each variable must contain a minimum of 5 to 10 observations per item to conduct factor analysis (Comrey & Lee, 1992). A minimum number of absolute observations for factor analysis is 150 to 300 (Hutcheson & Sofroniou, 1999), however, to conduct regression analysis with four predictor variables a minimum of 150 cases is required (Anderson et al., 2017).
- **Multicollinearity –** The existence of multicollinearity is not appropriate for factor analysis, and multicollinearity exists when high correlation coefficients are present among the independent variables. To test for multicollinearity, the Variance Inflation Factor (VIF) were studied. To perform a factor and regression analysis on the dataset, a VIF<10 had to be achieved to indicate the absence of multicollinearity (Hair et al., 2010; Field, 2013).

The assumption testing results follow:

Normality

The variables that made up the Productive Energy Measure (PEM) questionnaire developed by Cole et al. (2012) and the Project Success Questionnaire (PSQ) developed by Pinto and Slevin (1987) were evaluated for item normality. Item normality was evaluated using the skewness and kurtosis statistics and whether the item statistics fell within acceptable limits for normally distributed data. The skewness limit is regarded as a range of -2.58 to +2.58, while the kurtosis limit is a range of -7 to +7 (Awang, 2014); significant problems would occur in statistical testing for values above these limits. The observed variables followed mostly normal distributions. Table 45 within the appendices provides further detail on item normality. The normality assumption test was realised.

Outliers

Outliers were removed from the dataset using Mahalanobis distance test and discussed in detail in Section 4.9.1.1. The outlier assumption test was achieved.

Linearity

A curve estimation was conducted in SPSS for all relationships in the model, which displayed that all relationships were adequately linear to conduct structural equation modelling. Table 46, Table 47 and Table 45 within the appendices provide details regarding curve estimation and linearity testing. Table 13 provides an overview of linearity assumptions. The linearity assumption was achieved.

Table 13: Linearity assumption summary

Independent variable	R Square	F	Sig.
Affective dimension	.277	88.806	p<.001
Behavioural dimension	.276	88.275	p<.001
Cognitive dimension	.195	56.147	p<.001
Organisational energy	.316	107.078	p<.001

Note. The dependent variable is project success

Source: Author’s own research

Factorability

A factor should contain at least three variables. The KMO and Bartlett’s test results were indicative of factorability. The factorability assumption was achieved.

Sample size

The recommended sample size was between 150 and 300 for both factor and regression analysis (Hutcheson & Sofroniou, 1999). A sample size of 250 was achieved to conduct factor analysis and regression analysis. More detail was provided in Section 4.9.1.1. The sample size assumption test was achieved.

Multicollinearity

To conduct an effective regression analysis, it is pertinent that the correlation among predictor variables is considered. Extreme collinearity can occur when the same observed variables load on the same unobserved variables (Kline, 2011). The optimum relationship would be to have highly correlated dependent and independent variables, but low correlation coefficients should be observed between independent variables. The occurrence of multicollinearity can have a massive impact on the regression weights and their tests for statistical significance (Hair et al., 2010). Multicollinearity reduces the overall R^2 that can be achieved.

Determining if predictor variables are highly correlated is the first step to determining whether collinearity exists (Hair et al., 2010), which entails analysing a correlation matrix on the independent variables. Substantial collinearity is indicated by the presence of high correlations (r>.9). The highest correlation was r = .80 between the behavioural and cognitive dimensions, which was below the r>.9 threshold. The table below indicates that there are no unacceptably high correlations, however, this may not eliminate multicollinearity in its entirety as combined effects from the independent variables can occur.

To determine the presence of multicollinearity, further investigation was conducted using the regression function in SPSS, which determined the tolerance and variance inflation factors (VIF) for all the independent variables. In the table below the results have been depicted. For all independent variables, the VIF<10 and this was an indication that no significant multicollinearity existed in the dataset. Table 14 and Table 15 provide an overview of factor correlations and multicollinearity results. The multicollinearity assumption was achieved.

Table 14: Factor correlations

Constructs	R Square	F	Sig.
Affective dimension	1	.658**	.639**
Behavioural dimension	.658**	1	.800**
Cognitive dimension	.639**	.800**	1

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

Source: Author's own research

Table 15: Multicollinearity results

Constructs	Tolerance	VIF
Dependent variable: Affective dimension		
Behavioural dimension	.361	2.773
Cognitive dimension	.361	2.773
Dependent variable: Behavioural dimension		
Affective dimension	.591	1.691
Cognitive dimension	.591	1.691
Dependent variable: Cognitive dimension		
Behavioural dimension	.568	1.762
Affective dimension	.568	1.762

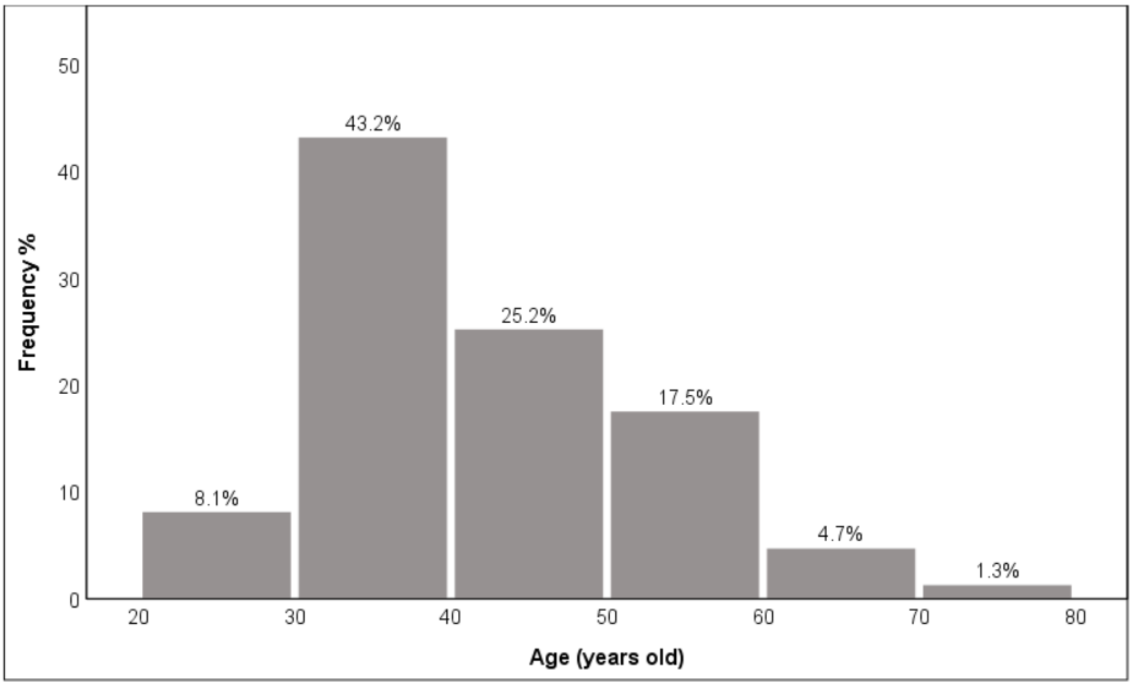
Source: Author's own research

5.2. Descriptive statistics

5.2.1. Age distribution

The respondents were primarily between the ages of 31 to 40-year-old at 43.2%. More project managers were observed in the 31 to 60-year-old groups as these individuals usually have the requisite qualifications and experience to fulfil these project roles. The results are depicted in Figure 6.

Figure 6: Age distribution of respondents

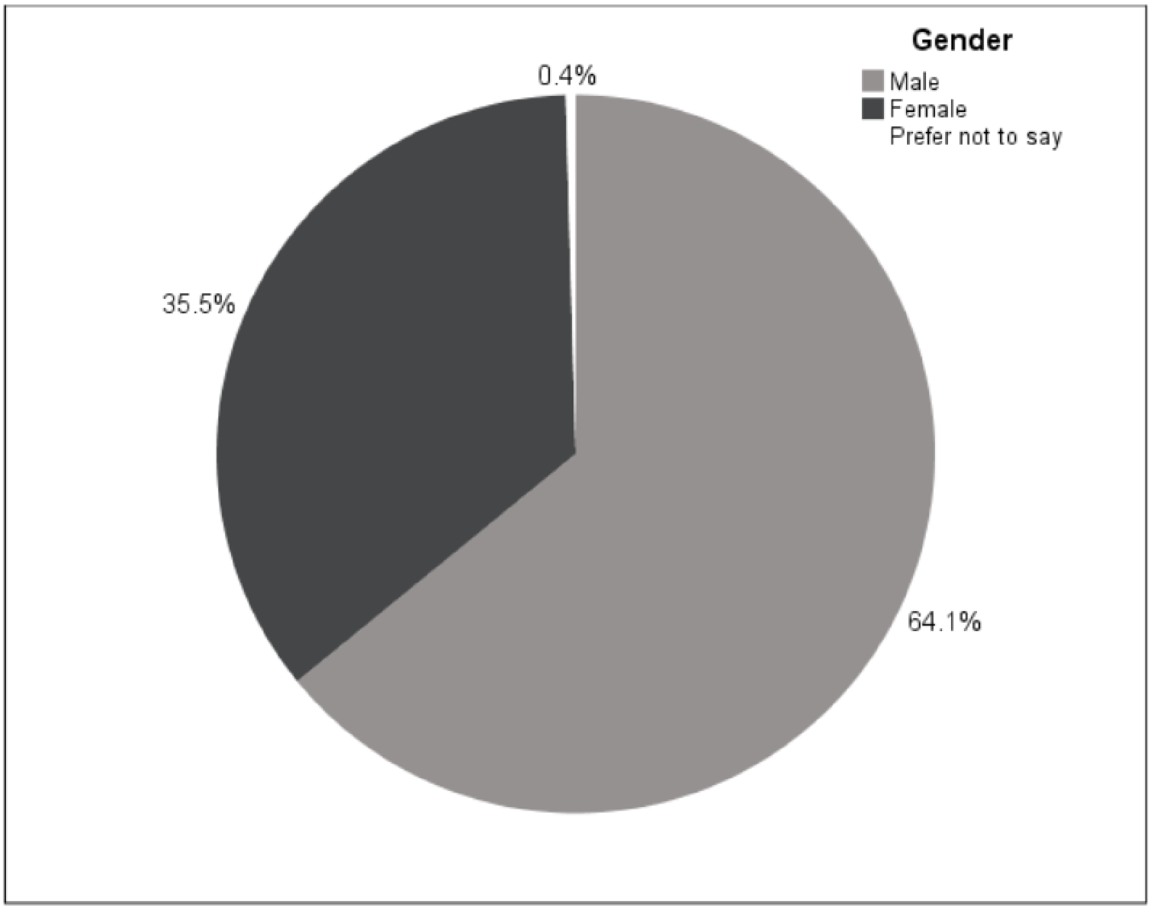


Source: Author's own research

5.2.2. Gender distribution

The respondents were primarily male (64.1%), this was because the project environment is largely a male-dominated environment, specifically within the mining and construction project environment (Pinto et al., 2017). The results are depicted in Figure 7.

Figure 7: Gender distribution of respondents

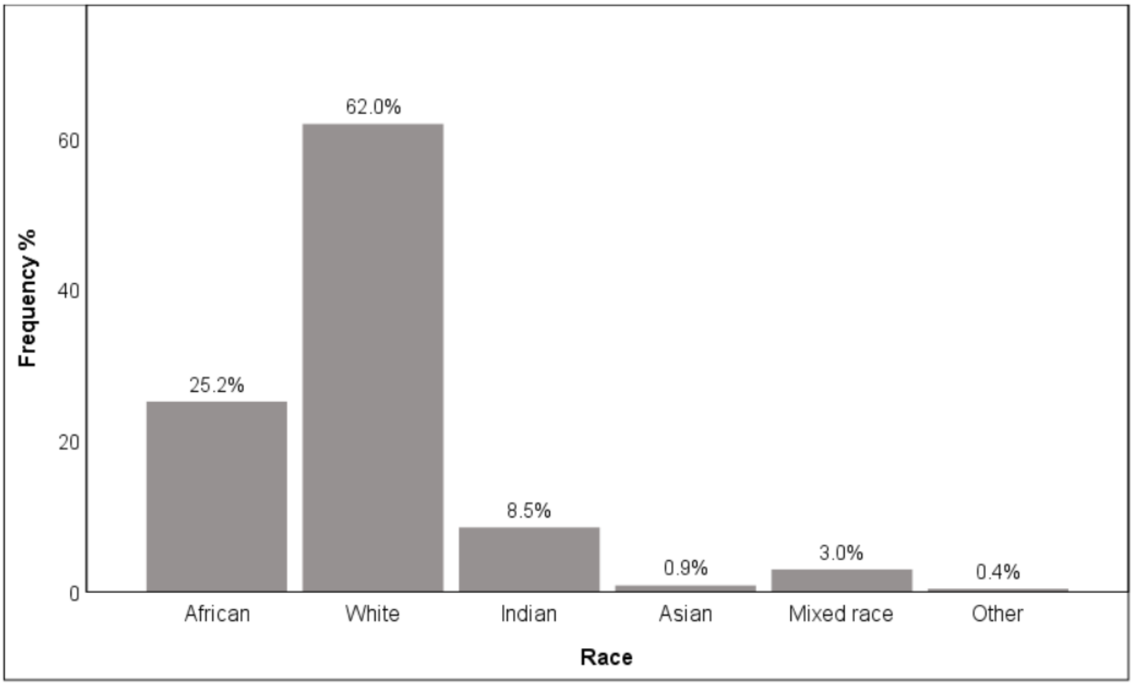


Source: Author's own research

5.2.3. Race distribution

Race was primarily dominated by Whites and Black Africans at 62% and 25% respectively. The racial bias in the study was due to the fact that a majority of the participants originated from the mining industry, which is known for its lack of transformation and employee equity (Heyns & Mostert, 2018), as shown in Figure 8.

Figure 8: Race distribution of respondents



Source: Author's own research

5.2.4. Industry-type distribution

The industries the respondents worked in were grouped into nine types, namely:

- Mining
- Information technology
- Financial
- Automotive
- Construction
- Medical and healthcare
- Education
- Consulting
- Other

Most respondents primarily came from the mining industry at 44%. The researcher worked extensively in the mining industry and believed that the study could have been biased toward this sector. Table 16 indicates the types of industries within the dataset.

Table 16: Industry-type distribution of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Mining	103	44.0	44.0	44.0
	Information Technology	22	9.4	9.4	53.4
	Financial	23	9.8	9.8	63.2
	Automotive	4	1.7	1.7	65.0
	Construction	12	5.1	5.1	70.1
	Medical and Healthcare	8	3.4	3.4	73.5
	Education	11	4.7	4.7	78.2
	Consulting	47	20.1	20.1	98.3
	Other	4	1.7	1.7	100.0
	Total	234	100.0	100.0	

Source: Author's own research

5.2.5. Job title distribution

The job titles were grouped into five categories, namely:

- Junior manager
- Middle manager
- Senior manager
- Top manager
- Other

The respondents' level of management was mostly middle management at 50%. This was due to the fact that most project managers or individuals who manage projects are within the middle management band; a limited number of individuals continue to manage projects as they attain more senior positions. Table 17 illustrates the level of management.

Table 17: Job title distribution of respondents

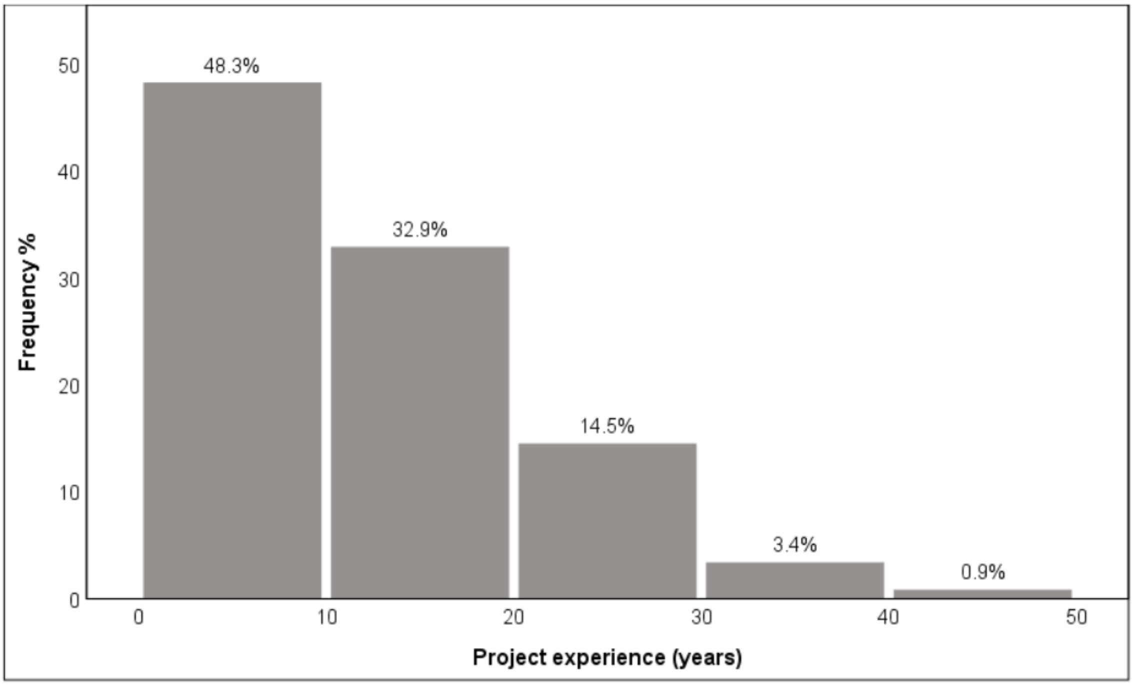
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Junior manager	23	9.8	9.8	9.8
	Middle manager	117	50.0	50.0	59.8
	Senior manager	45	19.2	19.2	79.1
	Top manager	33	14.1	14.1	93.2
	Other	16	6.8	6.8	100.0
	Total	234	100.0	100.0	

Source: Author's own research

5.2.6. Project experience distribution

Almost half (48%) of the respondents had 0 to 10 years experience. As project professionals gain more experience in project management, they start taking on more senior roles, moving out of purely project management roles to manage multiple projects or enter general management. Figure 9 illustrates the respondents' project experience.

Figure 9: Project experience distribution of respondents



Source: Author's own research

5.2.7. Project - type distribution

Project types were categorised into four categories, namely:

- Capital and infrastructure projects;
- Information technology projects;
- Process re-engineering or improvement projects; and
- Other.

The respondents were mixed across the various types of projects, and no specific project was dominant. Table 18 indicates the project-type distribution.

Table 18: Project-type distribution of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Capital and Infrastructure**	58	24.8	24.8	24.8
	Information technology	49	20.9	20.9	45.7
	Process reengineering or improvement	64	27.4	27.4	73.1
	Other	63	26.9	26.9	100.0
	Total	234	100.0	100.0	

Source: Author's own research

5.3. Exploratory factor analysis

5.3.1. Introduction

The steps to conduct an exploratory factor analysis were articulated in Table 5 in the research methodology chapter. These steps were followed to reduce the dataset to fewer constructs so as to explore the theoretical structure (Yong & Pearce, 2013).

To determine whether it was feasible to conduct an EFA, the suitability of the data was first investigated through a Kaiser-Meyer-Olkin (KMO) statistic and Barlett's test of sphericity.

Factor analysis was conducted in three steps, namely determining the suitability of the data, factor extraction and factor rotation and interpretation.

5.3.2. Suitability of data

The Kaiser-Meyer-Olkin measure to determine sample adequacy for all items of PEM and PSQ scales were high (KMO=.945), and this indicated good sample adequacy (KMO>.6) (Hair et al., 2010; Pallant, 2011). The KMO value provides an indication that the sample adequacy criteria was achieved and factor analysis can be conducted. The Bartlett's test of sphericity tests the general significance of correlations within the dataset, was significant ($\chi^2(325) = 5112.593$, $p<.001$) indicating that factor analysis could be conducted.

The results from the KMO test and Bartlett's test of sphericity are indicated in Table 19.

Table 19: KMO and Bartlett's test for sphericity results

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.945
Bartlett's Test of Sphericity	**Approx. Chi-Square**	5112.593
	df	325
	Sig.	.000

Source: Author's own research

5.3.3. Factor extraction

The extraction method of Principal Component Analysis (PCA) was used in the factor analysis. PCA was utilised so as to extract the highest variance and condense a large number of variables into a reduced number of components (Yong & Pearce, 2013). As shown in Table 20, the quantity of components were ascertained from the eigenvalues, and the total variance explained.

Table 20: Initial eigenvalues and variance

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	12.239	47.074	47.074	12.239	47.074	47.074
2	3.626	13.946	61.020	3.626	13.946	61.020
3	1.451	5.580	66.600	1.451	5.580	66.600
4	1.243	4.781	71.381	1.243	4.781	71.381
5	.787	3.028	74.409			
6	.663	2.550	76.959			
7	.611	2.351	79.311			
8	.559	2.150	81.460			
9	.512	1.969	83.429			
10	.473	1.821	85.250			
11	.394	1.517	86.767			
12	.374	1.439	88.206			
13	.354	1.360	89.566			
14	.327	1.259	90.826			
15	.305	1.174	91.999			
16	.283	1.088	93.087			
17	.252	.968	94.055			
18	.235	.903	94.958			
19	.229	.883	95.841			
20	.216	.832	96.672			
21	.192	.737	97.410			
22	.175	.673	98.083			
23	.144	.555	98.638			
24	.133	.513	99.151			
25	.123	.472	99.623			
26	.098	.377	100.000			

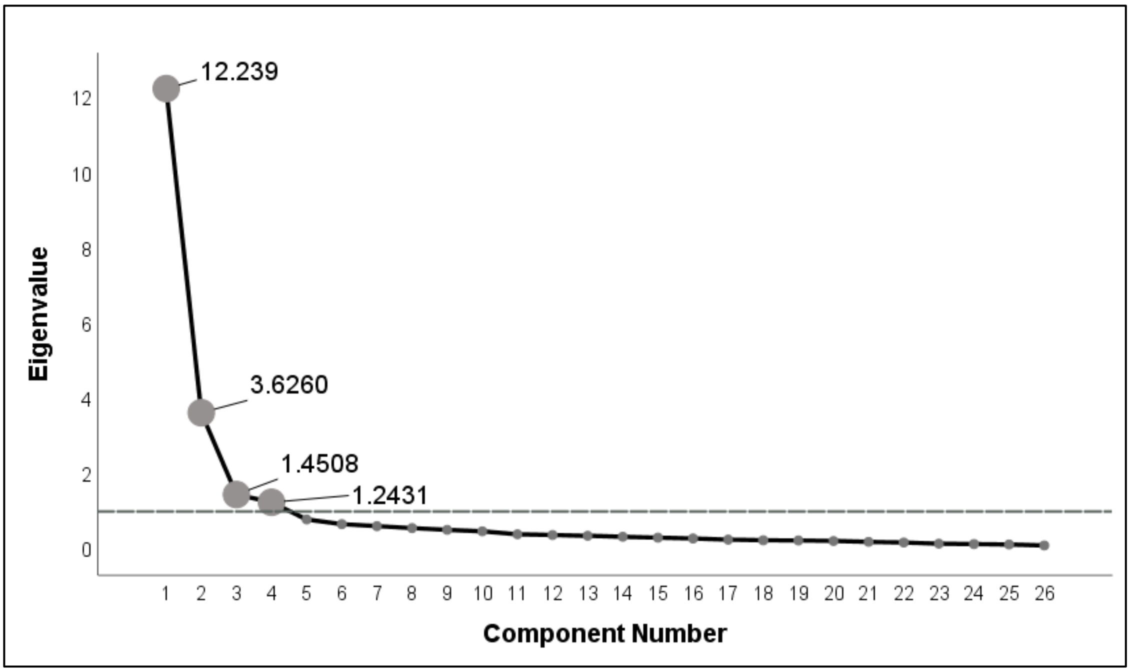
Note. Extraction Method: Principal Component Analysis

Source: Author’s own research

The analysis conducted indicated that four components displayed eigenvalues above 1. The four components explained 71.4% of the total variance. When using the Kaiser criterion, four components could be regarded as adequate. Therefore the common variance shared by 26 variables was accounted for in four factors. These factors were confirmed in the following step of factor rotation and interpretation.

The scree plot depicted the quantity of components above an eigenvalue of 1. Four factors were identified above the inflection point.

Figure 10: Scree plot of eigenvalues



Source: Author's own research

5.3.4. Factor rotation and interpretation

To interpret the factors and maximise the variance, a varimax orthogonal rotation was performed to extract the components. A varimax rotation method was utilised so that the number of items with high factor loadings on each component could be minimised and make small factor loadings smaller. When no former evidence that the correlation between factors exists, a varimax rotation method can be adopted (Yong & Pearce, 2013). Items loaded onto a component if their largest coefficient was associated with that factor (Hair, Black, Babin, & Anderson, 2010; Pallant, 2011).

Item coefficients that were closer to 1 showed that the question was highly associated with that component, while item coefficients nearer to 0 showed a diminished correlation. The minimum threshold is regarded as .4 and items below this threshold should be disregarded (Basto & Pereira, 2012). The rotation output is shown in Table 21.

Table 21: Rotated component matrix

Rotated Component Matrix[a]

	Component			
	1	2	3	4
PSQ7	.885			
PSQ10	.885			
PSQ12	.855			
PSQ11	.847			
PSQ6	.845			
PSQ5	.800			
PSQ4	.778			
PSQ3	.697			
PSQ8	.659			
PSQ9	.637			.510
PEM9		.768		
PEM10		.766		
PEM13		.745		
PEM11		.742		
PEM12		.728		
PEM8		.672		
PEM6		.659		
PEM7		.636		
PEM14		.582		
PEM3			.783	
PEM1			.769	
PEM5			.763	
PEM2			.757	
PEM4			.740	
PSQ2				.810
PSQ1				.793

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalisation.[a]

a. Rotation converged in 6 iterations.

Source: Author's own research

The extraction of four components was supported by the varimax rotation. The items that have the highest loading values are highlighted in Table 22.

Table 22: EFA components

Component	Construct	Items loaded
1	Client factor (CF) within PS construct	PSQ3 to PSQ12
2	Behavioural and cognitive dimension (BCD)	PEM6 to PEM14
3	Affective dimension (AD)	PEM1 to PEM5
4	Project factor (PF) within PS construct	PSQ1 to PSQ2

Source: Author's own research

The varimax orthogonal rotation used to extracted components shows that four components exist. These constructs items are all strongly correlated and could not be divided into subgroups. Cross-loading took place between component 1 and component 4. The item PSQ9 cross-loaded onto component 1 and component 4. The component with the highest loading was given preference over the lower loading component. The exploratory factor analysis supported the use of four components.

5.3.5. Reliability

Cronbach's alpha coefficient was computed to ascertain whether the measurement subscale for each of the components identified in the exploratory factor analysis was reliable. The results are depicted in Table 23.

Table 23: Cronbach's alpha test for exploratory factor analysis

Construct	Cronbach's alpha	Threshold
CF	0.918	α >.70 – good reliability
BCD	0.908	α >.70 – good reliability
AD	0.902	α >.70 – good reliability
PF	0.957	α >.70 – good reliability

Source: Author's own research

The Cronbach's alpha test for reliability for all scales depicted good reliability (α>.70) (Awang, 2014; Hair et al., 2010). It is postulated that all the items in the survey contributed to the measurement. Hence no items were removed from the instrument. Detailed results are depicted in Table 51 within the appendices.

5.4. Structural Equation Modelling

5.4.1. Introduction

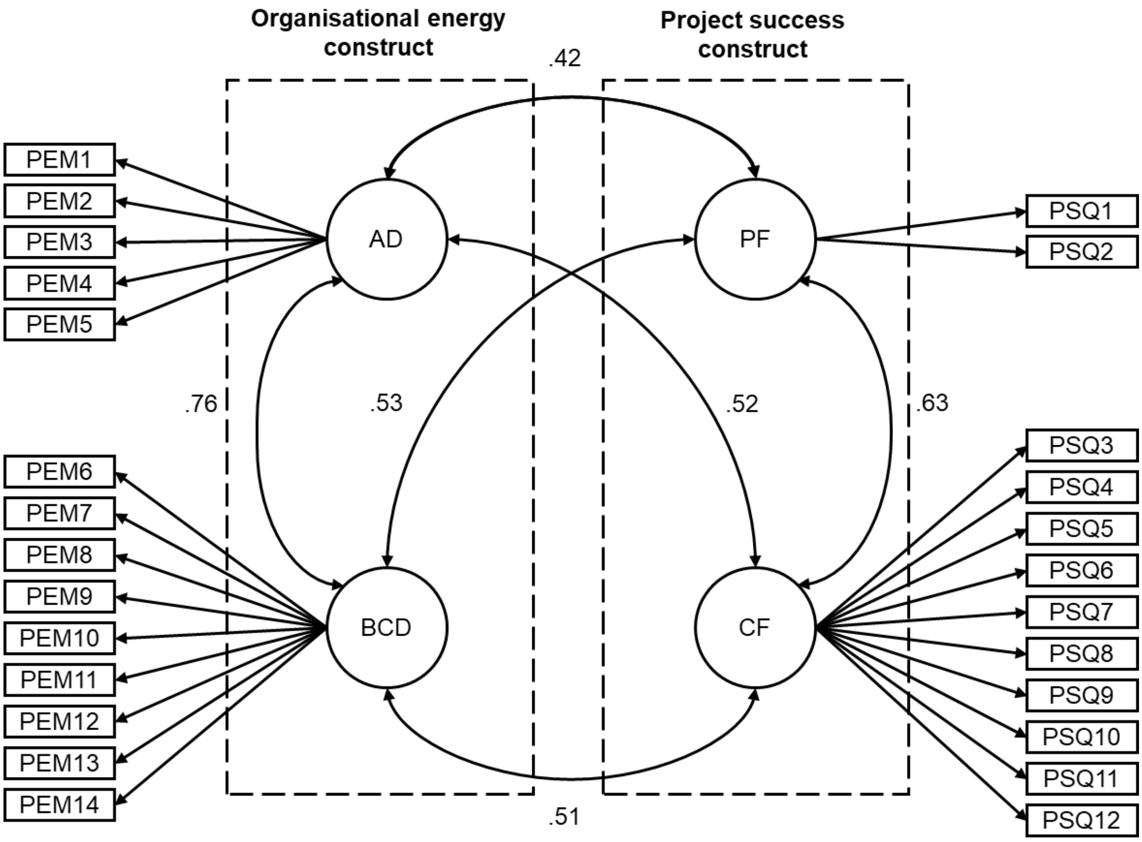
A two-step method for structural equation modelling was followed (Schumacher & Lomax, 2004), with the initial step being to develop the measurement model to determine whether the hypothesis postulated about the measurement scale was correct. The second step in the process was developing the structural models that tested the *a priori* hypotheses. Ultimately, the difference between the two models is that one determines measurement issues and the other determines structural issues.

In both the measurement and structural models, models were developed for each measurement scale to confirm adequate item loading on the relevant constructs and convergent, discriminant and nomological validity. Reliability analysis using the composite reliability coefficient was computed for each measurement scale, and lastly, the model fit was assessed to ensure adequate goodness-of-fit. The structural equation modelling steps are articulated in Table 3 in the research methodology section.

5.4.2. Measurement model

The measurement model was developed according to steps articulated in Table 8. IBM AMOS (version 25) was utilised to conduct the confirmatory factor analysis. The rotated component matrix was used from the EFA results to substantiate the components that were analysed in the structural model. The final measurement model is depicted in Figure 11. The detailed measurement model including unstandardised and standardised estimates, including factor loadings, item R^2 and measurement error terms, are displayed in the appendices under Figure 17 and Figure 20.

Figure 11: Measurement model



Note. AD = Affective Dimension, BCD = Behavioural and Cognitive Dimension, PF = Project Factor, CF = Client Factor, PEM = Project Energy Measure, PSQ = Project Success Questionnaire
Source: Author's own research

The measurement model substantiated the EFA findings, illustrating that the observed variables were associated with each of the unobserved variables. The measurement model depicts four components, factor loadings and correlation estimates. The validity and reliability of the measurement model were tested after the development of the model. No items were removed from the measurement model as a good model fit, depicted later in this section, was achieved without this being necessary.

5.4.2.1. Factor loadings

All factor loadings within the model were greater than .50 which is regarded as acceptable, and the majority of the factor loadings higher than the ideal threshold of .70 (Hair et al., 2010). Factor loadings were regarded as significant at a 95% confidence level. The measures used in this research can thus be regarded as acceptable.

5.4.2.2. *Correlation estimates*

Table 64 in the appendices illustrates the correlation estimates and their significance in the measurement model. The correlation estimates were below .70, with the exclusion of the correlation estimate between the affective dimension (AD) and behavioural and cognitive dimension (BCD) at .76. All estimates were significant at a 95% confidence interval.

5.4.2.3. *Validity*

Convergent and discriminant validity

To determine whether convergent validity existed, the factor loadings for constructs were reviewed. Items that had a higher factor loading onto a factor display than these items converged to reflect a common latent factor. The main problem to consider when conducting a CFA is what factor loading is appropriate to preserve an item. Practical significance, statistical significance and the number of variables influence the analysis of the factor loadings.

The factor loading illustrates the item correlation to the factor, and the square loading is an indication of the percentage of item variance shared with the factor. From a practical standpoint, factor loadings of .50 and greater meet the minimum threshold required for interpretation of a structure. Factor loadings that exceed .70 are regarded as desirable for construct validity (Hair et al., 2010). To achieve good construct validity, it is important that standardised factor loadings are greater than .70.

The factor loading for item PEM14 at .52 was below the threshold of .70, the item was retained as the model fit including the item was still good, PEM14 formed part of measurement scales used by Cole et al. (2012) and content validity may have been a concern were it removed. Ultimately items were retained if they had optimal loadings, increased reliability and did not cause model fit issues.

To measure and determine discriminant validity, the square of the correlation estimate was computed and compared to the AVE estimate for each factor. The AVE estimates must be greater than the MSV estimates to achieve discriminant validity (Hair et al., 2010). For each component, convergent validity (AVE) and discriminant validity (MSV) were computed. These calculations are depicted in Table 24.

Table 24: Convergent and discriminant validity tests of measurement model

Construct	Convergent validity	Discriminant validity
	AVE	MSV
AD	0.675	0.584
CF	0.658	0.402
BCD	0.591	0.584
PF	0.823	0.402

Source: Author's own research

The AVE scores for all the components were regarded as satisfactory (AVE>.50) (Hair et al., 2010). There were no discriminate validity concerns amongst the components as the MSV scores were less than the AVE scores. This is a clear indication that these components were not strongly correlated with other components and cross-loading of observed variables did not occur.

Nomological validity

To determine whether nomological validity was achieved the correlations between components in the measurement model were to ascertain whether significant correlation made theoretical sense (Hair et al., 2010). The significance of the correlations is indicated with a *p*<.01. The correlations are depicted in Table 25.

Table 25: Nomological validity assessment of measurement model

Correlations

		AD_MM	BCD_MM	PF_MM	CF_MM
AD_MM	**Pearson Correlation**	1	.684**	.415**	.509**
	Sig. (2-tailed)		.000	.000	.000
	Sum of Squares and Cross-products	146.717	95.055	119.209	97.697
	Covariance	.630	.408	.512	.419
	N	234	234	234	234
BCD_MM	**Pearson Correlation**	.684**	1	.473**	.478**
	Sig. (2-tailed)	.000		.000	.000
	Sum of Squares and Cross-products	95.055	131.591	128.648	86.875
	Covariance	.408	.565	.552	.373
	N	234	234	234	234
PF_MM	**Pearson Correlation**	.415**	.473**	1	.599**
	Sig. (2-tailed)	.000	.000		.000
	Sum of Squares and Cross-products	119.209	128.648	563.223	225.396
	Covariance	.512	.552	2.417	.967
	N	234	234	234	234
CF_MM	**Pearson Correlation**	.509**	.478**	.599**	1
	Sig. (2-tailed)	.000	.000	.000	
	Sum of Squares and Cross-products	97.697	86.875	225.396	251.019
	Covariance	.419	.373	.967	1.077
	N	234	234	234	234

Note. **. Correlation is significant at the 0.01 level (2-tailed).
Source: Author's own research

Theoretical propositions regarding the relationship between organisational energy factors and project success factors can be observed in the dataset. A significant correlation was observed between the organisational energy constructs, namely the affective and behavioural and cognitive dimensions, and the project success constructs of project factor and client factor. The relationships have presented as per the *a priori* hypothesis, however, the behavioural and cognitive dimension factors have loaded onto one construct. It is clear that as per the correlation analysis, the measurement model supports nomological validity.

The analysis shows that convergent validity, discriminant validity and nomological validity were satisfactory.

5.4.2.4. Reliability

The internal consistency and reliability of the model was measured utilising composite reliability coefficient. In some instances, coefficient alphas underrepresent reliability; in these cases, Composite Reliability (CR) must also be assessed. Composite Reliability computes the "squared sum of factor loading (L_i) for each construct and the sum of the error variance terms for a construct (e_i)" (Hair et al., 2010, p.616). The lower threshold that is indicative of adequate reliability is (CR>.70) for Composite Reliability (Hair et al., 2010). The Composite Reliability equation is depicted in Equation 3.

Equation 3: Composite reliability equation

$$CR = \frac{\left(\sum \lambda_i\right)^2}{\left(\sum \lambda_i\right)^2 + \left(\sum \epsilon_i\right)}$$

Source: Raykov (1997)

Reliability tests were conducted on the measurement model, which included the Composite Reliability Coefficient test. The results are depicted in Table 26.

Table 26: Reliability tests on the measurement model

Construct	Composite Reliability Coefficient	Threshold
AD	0.822	α >.70 – good reliability
BCD	0.769	α >.70 – good reliability
PF	0.907	α >.70 – good reliability
CF	0.811	α >.70 – good reliability

Source: Author's own research

The Composite Reliability test for reliability for all scales depicted good reliability (CR>.70) (Awang, 2014; Hair et al., 2010). It was postulated that all the items in the survey contributed to the measurement model. Thus no items were removed from the instrument. The measurement model fit analysis was performed.

5.4.2.5. *Model fit analysis*

The table below illustrates the goodness-of-fit for the measurement model. The thresholds for model fit indices have been articulated in Table 7. The chi-square for the measurement model was: χ^2 (25, *N*=250) =413.01, *p*<.001. The ratio of chi-squared to the degrees of freedom, χ^2/df = 1.45, was below 2.00, indicating a good fit (Hair et al., 2010; Schreiber et al., 2006). The model fit indices were conducted, and the results are depicted in Table 27.

Table 27: Measurement model fit indices

Fit indices	Calculated value	Criteria
CMIN/DF	1.449	• Cmin/df≤2 depicts good fit • 2≥Cmin/df≤5 depicts an acceptable fit
GFI	0.880	• Above .90 good • Above .80 acceptable
TLI	0.971	• Above .90 good • Above .80 acceptable
CFI	0.974	• Above .90 good • Above .80 acceptable
RMSEA	0.044	• < .05 good • .05 to .10 moderate

Source: Author's own research

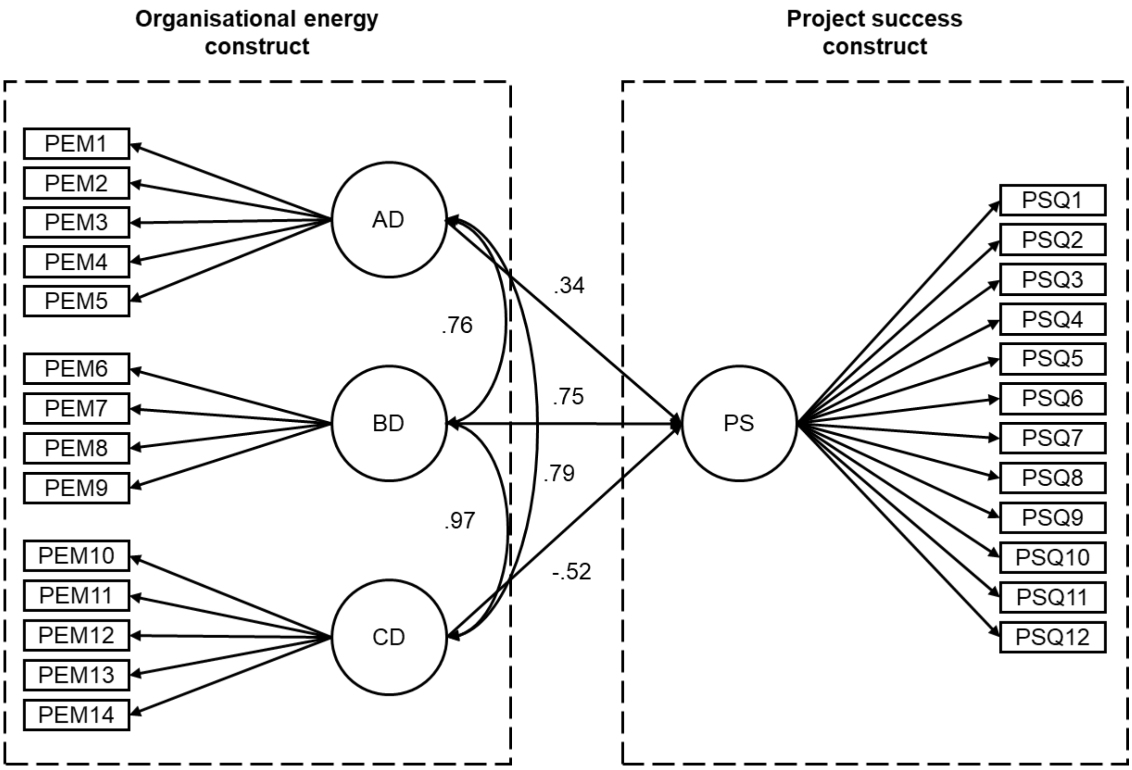
TLI, CFI, RMSEA and the chi-squared/Df ratio met the criteria for good fit, while GFI met the criteria for an acceptable fit. The measurement model was thus a good fit for the dataset.

A measurement model approach provided satisfactory results, and no validity or reliability concerns were observed. The model fit fell within acceptable thresholds. Thus it was accepted.

5.4.3. Structural model

The theoretical structural model was constructed using the steps articulated in Table 2 and tested with maximum likelihood in IBM AMOS (version 25). The model is depicted in Figure 12. The detailed structural model with unstandardised and standardised estimates, including factor loadings, item R^2 and measurement error terms, are displayed in the appendices under Figure 19 and Figure 20.

Figure 12: Structural model



Note. AD = Affective Dimension, BD = Behavioural Dimension, CD = Cognitive Dimension, PS = Project Success, PEM = Project Energy Measure, and PSQ = Project Success Questionnaire

Source: Author's own research

Much the same as the measurement model, the structural model depicts the correlation coefficients as well as the regression coefficients between the various unobserved variables. The observed and unobserved variables are explained below.

5.4.3.1. Correlation estimates

Table 28 the structural model correlation estimates and their significance. The correlation estimates for PSQ observed variables were below the maximum threshold (*r*<.70) and were regarded as acceptable. The correlation estimates for the unobserved variables of PEM were above the maximum threshold (*r*<.70).

Table 28: Structural model correlation estimates

Constructs			Estimate	P - value
AD	←→	**BD**	0.761	*p*<.001
BD	←→	**CD**	0.972	*p*<.001
AD	←→	**CD**	0.748	*p*<.001

Source: Author's own research

The correlation estimates depicted in Table 28 are above the maximum threshold of (r<.70) and are significant. The investigation into the reason why these correlation estimates fell outside the threshold was discussed in the validity section and will be examined further in the discussion chapter.

Overall, the structural model conformed to the measurement scales used and the items loaded onto the relevant constructs.

5.4.3.2. Validity

Convergent and discriminant validity

Convergent validity (AVE) and Discriminant validity (MSV) were computed for each component. These calculations are depicted in Table 29.

Table 29: Convergent and Discriminant Validity tests for structural model

Construct	Convergent validity	Discriminant validity
	AVE	**MSV**
AD	0.599	0.579
BD	0.540	0.945
CD	0.523	0.945

Source: Author's own research

The AVE scores for all the components were regarded as satisfactory (AVE>.50) (Hair et al., 2010). There were no discriminate validity concerns about the affective dimension (AD) as the MSV coefficient was less than the AVE coefficient. There were discriminant validity concerns with the behavioural and cognitive dimension constructs, as the MSV scores were higher than the AVE scores. This is an indication that these constructs are strongly correlated with each other and may contain cross-loadings between observed variables.

Convergent validity testing showed that the model is satisfactory, while discriminant validity testing highlighted issues due to the high correlation between the behavioural and cognitive constructs.

Nomological validity

To determine whether nomological validity was achieved the correlations between components in the measurement model were to ascertain whether significant correlation made theoretical sense (Hair et al., 2010). Correlations between the constructs are presented below. The significance of the correlations is indicated with a $p \leq .05$. The correlations are depicted in Table 30.

Table 30: Nomological validity assessment for structural model

Correlations

		AD_SM	BD_SM	CD_SM
AD_SM	**Pearson Correlation**	1	.652**	.649**
	Sig. (2-tailed)		.000	.000
	Sum of Squares and Cross-products	146.717	97.281	93.274
	Covariance	.630	.418	.400
	N	234	234	234
BD_SM	**Pearson Correlation**	.652**	1	.807**
	Sig. (2-tailed)	.000		.000
	Sum of Squares and Cross-products	97.281	151.621	117.858
	Covariance	.418	.651	.506
	N	234	234	234
CD_SM	**Pearson Correlation**	.649**	.807**	1
	Sig. (2-tailed)	.000	.000	
	Sum of Squares and Cross-products	93.274	117.858	140.746
	Covariance	.400	.506	.604
	N	234	234	234

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

Source: Author's own research

Theoretical propositions regarding the relationship between the organisational energy factors and project success were observed in the dataset. A correlation that was significant was observed between the behavioural and cognitive dimensions. The relationships presented as per the *a priori* hypothesis, however, the behavioural and cognitive dimension factors were strongly correlated. Recognising this limitation, the other correlations confirm that the structural model supports nomological validity.

The analysis shows that convergent validity, discriminant validity and nomological validity were satisfactory.

5.4.3.3. Reliability

Reliability tests were conducted on the structural model, which included the Composite Reliability Coefficient test. The results are depicted in Table 31.

Table 31: Cronbach's alpha test for structural model

Construct	Composite Reliability Coefficient	Threshold
AD	0.774	α >.70 – good reliability
BD	0.735	α >.70 – good reliability
CD	0.723	α >.70 – good reliability
PS	0.949	α >.70 – good reliability

Source: Author's own research

The Composite Reliability test for reliability for all scales depicted good reliability (CR>.70) (Hair et al., 2010; Awang, 2014). It was postulated that all the items in the survey contributed to the structural model. Thus no items were removed from the instrument.

The structural model approach provided satisfactory results, and no validity or reliability concerns were observed, however, a significant correlation between the behavioural and cognitive dimension was observed that had caused discriminant validity concerns. The model fit thus falls within acceptable thresholds, and the structural model is accepted. The aggregate structural model follows.

5.4.3.4. Model fit analysis

The table below illustrates the goodness-of-fit for the structural model. The chi-square for the measurement model was χ^2(25, *N*=234) =447.61, *p*<.001, while the ratio of chi-squared to the degrees of freedom was χ^2/df = 1.57, was below 2.00, indicating a good fit (Hair et al., 2010; Schreiber et al., 2006). The model fit indices were conducted, and the results are depicted in Table 32.

Table 32: Structural model fit indices

Fit indices	Calculated value	Criteria
CMIN/DF	1.565	• Cmin/df≤2 depicts good fit • 2≥Cmin/df≤5 depicts an acceptable fit
GFI	0.872	• Above .90 good • Above .80 acceptable
TLI	0.963	• Above .90 good • Above .80 acceptable
CFI	0.968	• Above .90 good • Above .80 acceptable
RMSEA	0.049	• < .05 good • .05 to .10 moderate

Source: Author's own research

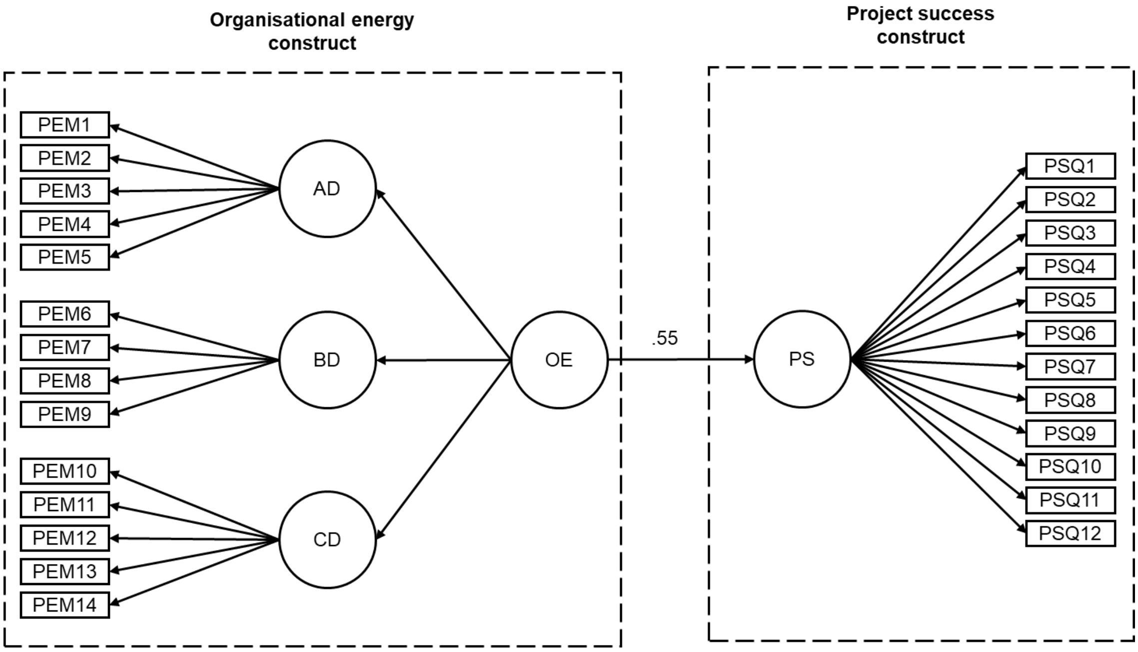
TLI, CFI, RMSEA and the chi-squared/Df ratio met the criteria for good fit, while GFI met the criteria for an acceptable fit. The structural model was thus a good fit for the dataset.

A structural model approach provided satisfactory results, and no validity or reliability concerns were observed. The model fit fell within acceptable thresholds. Thus it was accepted.

5.4.4. Aggregate structural model

The theoretical structural model was constructed using the steps articulated in Table 3 and tested with maximum likelihood in IBM AMOS (version 25). The model is depicted in Figure 13. The aggregate structural model with unstandardised and standardised estimates, including factor loadings, item R^2, and measurement error terms, are displayed in the appendices under Figure 21 and Figure 22.

Figure 13: Aggregate structural model



Note. AD = Affective Dimension, BD = Behavioural Dimension, CD = Cognitive Dimension, OE = Organisational Energy, PS = Project Success, PEM = Project Energy Measure, PSQ = Project Success Questionnaire

Source: Author's own research

Much the same as the structural model, the aggregate structural model depicts the correlation coefficients as well as the regression coefficients between the various unobserved variables. The observed and unobserved variables are explained below.

5.4.4.1. Correlation estimates

A factor correlation matrix was not required in the aggregate structural model as the factor correlations were determined and explained in the structural model in Section 5.4.3 between the antecedents of organisational energy. The main objective of the aggregate structural model analysis was to determine the regression weight between the organisational energy construct and the project success construct.

5.4.4.2. Validity

Convergent, discriminant and nomological validity testing was not required in the aggregate structural model the significance of the model and whether the model was free of redundant items was determined in the structural model in Section 5.4.3 between the latent variables of organisational energy. The aggregate model was therefore assumed to have met validity criteria as the structural model met all validity criteria.

5.4.4.3. Reliability

Reliability tests were conducted on the aggregate structural model, which included the Composite Reliability Coefficient test. Results are depicted in Table 33.

Table 33: Reliability tests for the aggregate structural model

Construct	Composite Reliability Coefficient	Threshold
OE	0.935	α >.70 – good reliability
PS	0.949	α >.70 – good reliability

Source: Author's own research

The Composite Reliability test for reliability for all scales depicted good reliability (CR>.70) (Awang, 2014; Hair et al., 2010). It was postulated that all the items in the survey contributed to the aggregate structural model. Thus no items were removed from the instrument.

The aggregate structural model approach provided satisfactory results, and no validity or reliability concerns were observed. Thus the model fit fell within acceptable thresholds. The aggregate structural model was thus accepted, and the hypothesis testing followed.

5.4.4.4. Model fit analysis

The table below illustrates the goodness-of-fit for the aggregate structural model. The chi-square for the aggregate model was χ^2 (25, N=234) =455.38, p<.001 and the ratio of chi-squared to the degrees of freedom was χ^2/df = 1.60, was below 2.00, indicating a good fit (Hair et al., 2010; Schreiber et al., 2006). The model fit results are depicted in Table 34.

Table 34: Aggregate structural model fit indices

Fit indices	Calculated value	Criteria
CMIN/DF	1.598	• Cmin/df≤2 depicts good fit • 2≥Cmin/df≤5 depicts an acceptable fit
GFI	0.871	• Above .90 good • Above .80 acceptable
TLI	0.961	• Above .90 good • Above .80 acceptable
CFI	0.966	• Above .90 good • Above .80 acceptable
RMSEA	0.051	• < .05 good • .05 to .10 moderate

Source: Author's own research

TLI, CFI, RMSEA and the chi-squared/Df ratio met the criteria for good fit, while GFI and RMSEA met the criteria for acceptable and moderate fit respectively. The structural model was thus a good fit for the dataset.

An aggregate structural model approach provided satisfactory results, and no validity or reliability concerns were observed. The model fit fell within acceptable thresholds. Thus it was accepted.

5.5. Regression analysis

5.5.1. Introduction

Regression analysis was performed at a significance level of $p \leq .05$. The findings for each hypothesis are articulated in the sections below. The null and alternate hypotheses have been stated for each research question. Following the hypotheses, the results of the regression analysis are stated in a standardised format, followed by further detail in the regression tables. Key results for each hypothesis have been simplified for ease of understanding.

5.5.2. Regression analysis

5.5.2.1. Correlation analysis

The constructs' correlation coefficient values are described in the table below.

Table 35: Correlations between constructs

Correlations

		AD_AVG	BD_AVG	CD_AVG	OE_AVG	PS_AVG
AD_AVG	Pearson Correlation	1	.652**	.649**	.867**	.526**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	234	234	234	234	234
BD_AVG	Pearson Correlation	.652**	1	.807**	.903**	.508**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	234	234	234	234	234
CD_AVG	Pearson Correlation	.649**	.807**	1	.915**	.474**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	234	234	234	234	234
OE_AVG	Pearson Correlation	.867**	.903**	.915**	1	.562**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	234	234	234	234	234
PS_AVG	Pearson Correlation	.526**	.508**	.474**	.562**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	234	234	234	234	234

Note. **. Correlation is significant at the 0.01 level (2-tailed).
Source: Author's own research

Correlation among the various constructs was positive, and the correlation coefficients were all significant at $p<.001$. No negative correlations were observed between the constructs.

5.5.2.2. Hypothesis testing

Multiple regression analysis could only be conducted once the assumptions for regression analysis were met (see Section 5.1.1.2.). To test the hypotheses, multiple regression analysis was performed at a significance level of $p\leq.05$. The testing results are described in the sections below. The null and alternative hypotheses are stated at the beginning of each section, followed by the results of the regression analysis.

Research Hypothesis - Organisational energy dimensions

Research question one (RQ1a): Can it be predicted with reasonable accuracy that a relationship exists between the affective dimension (AD) and project success (PS)?

- **Null hypothesis one ($H_0$1a):** No significant relationship exists between the affective dimension (AD) and project success (PS).
- **Alternate hypothesis one ($H_1$1a):** A significant relationship exists between the affective dimension (AD) and project success (PS).

Table 36 depicts the linear regression analysis conducted for the affective dimension.

Table 36: Hypothesis 1a linear regression analysis

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.526[a]	.277	.274	.88730	.277	88.806	1	232	.000	2.127

a. Predictors: (Constant), AD_AVG

b. Dependent Variable: PS_AVG

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	69.918	1	69.918	88.806	.000[b]
	Residual	182.656	232	.787		
	Total	252.574	233			

a. Dependent Variable: PS_AVG

b. Predictors: (Constant), AD_AVG

Coefficients[a]

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.175	.255		12.428	.000
	AD_AVG	.690	.073	.526	9.424	.000

Source: Author's own research

Linear regression testing was performed to predict project success based on the affective dimension. The regression output is indicated in the table below. The regression equation was described as ($F(1,232)$ = 88.806, p<.001), with an R^2 of .277. The equation is depicted in Equation 4.

Equation 4: Linear equation for hypothesis 1a

$$PS = 3.175 + .690\ (AD)$$

Source: Author's own research

The Durbin-Watson (DW) statistic indicated that no autocorrelation occurred in the analysis due to the fact that the value was between 1.5 and 2.5 (Field, 2013).

Research question one (RQ1b): Can it be predicted with reasonable accuracy that a relationship exists between the behavioural dimension (BD) and project success (PS)?

- **Null hypothesis one (H_01b):** No significant relationship exists between the behavioural dimension (BD) and project success (PS).
- **Alternate hypothesis one (H_11b):** A significant relationship exists between the behavioural dimension (BD) and project success (PS).

Table 37: Hypothesis 1b linear regression analysis

Model Summary[b]

					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.525[a]	.276	.273	.88804	.276	88.275	1	232	.000	2.183

a. Predictors: (Constant), BD_AVG
b. Dependent Variable: PS_AVG

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	**Regression**	69.615	1	69.615	88.275	.000[b]
	Residual	182.959	232	.789		
	Total	252.574	233			

a. Dependent Variable: PS_AVG
b. Predictors: (Constant), BD_AVG

Coefficients[a]

		Unstandardised Coefficients		Standardised Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	**(Constant)**	2.991	.275		10.861	.000
	BD_AVG	.678	.072	.525	9.395	.000

Source: Author's own research

Linear regression testing was performed to predict project success based on the behavioural dimension. The regression output is indicated in the table below. The regression equation was described as (*F(1,232)* = 88.275, *p*<.001), with an R^2 of .276. The equation is depicted in Equation 5.

Equation 5: Linear equation for hypothesis 1b

$$PS = 2.991 + .678\ (BD)$$

Source: Author's own research

The Durbin-Watson (DW) statistic indicated that no autocorrelation occurred in the analysis due to the fact that the value was between 1.5 and 2.5 (Field, 2013).

Research question one (RQ1c): Can it be predicted with reasonable accuracy that a relationship exists between the cognitive dimension (CD) and project success (PS)?

- **Null hypothesis one ($H_0$1b):** No significant relationship exists between the cognitive dimension (CD) and project success (PS).
- **Alternate hypothesis one ($H_1$1b):** A significant relationship exists between the cognitive dimension (CD) and project success (PS).

Table 38: Hypothesis 1c linear regression analysis

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics: R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.441[a]	.195	.191	.93624	.195	56.147	1	232	.000	2.043

a. Predictors: (Constant), CD_AVG

b. Dependent Variable: PS_AVG

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	**Regression**	49.215	1	49.215	56.147	.000[b]
	Residual	203.358	232	.877		
	Total	252.574	233			

a. Dependent Variable: PS_AVG

b. Predictors: (Constant), CD_AVG

Coefficients[a]

Model		Unstandardised Coefficients B	Unstandardised Coefficients Std. Error	Standardised Coefficients Beta	t	Sig.
1	**(Constant)**	3.258	.308		10.581	.000
	CD_AVG	.595	.079	.441	7.493	.000

Source: Author's own research

Linear regression testing was performed to predict project success based on the cognitive dimension. The regression output is indicated in the table below. The regression equation was described as ($F(1,232)$ = 56.147, $p < .001$), with an R^2 of .195. The equation is depicted in Equation 6.

Equation 6: Linear equation for hypothesis 1c

$$PS = 3.258 + .595\ (CD)$$

Source: Author's own research

The Durbin-Watson (DW) statistic indicated that no autocorrelation occurred in the analysis due to the fact that the value was between 1.5 and 2.5 (Field, 2013).

Table 39: Hypothesis 1 multiple regression analysis

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics: R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.571[a]	.326	.317	.86044	.326	37.051	3	230	.000	2.195

a. Predictors: (Constant), CD_AVG, AD_AVG, BD_AVG

b. Dependent Variable: PS_AVG

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	82.293	3	27.431	37.051	.000[b]
	Residual	170.281	230	.740		
	Total	252.574	233			

a. Dependent Variable: PS_AVG

b. Predictors: (Constant), CD_AVG, AD_AVG, BD_AVG

Coefficients[a]

Model		Unstandardised Coefficients B	Std. Error	Standardised Coefficients Beta	t	Sig.
1	(Constant)	2.566	.296		8.673	.000
	AD_AVG	.425	.097	.324	4.363	.000
	BD_AVG	.312	.123	.242	2.531	.012
	CD_AVG	.091	.128	.068	.715	.476

Source: Author's own research

Using multiple regression analysis, the affective, behavioural and cognitive dimensions predicted approximately 32.6% of the variance in project success. A multiple regression was computed to predict project success (PS) based on the affective dimension (AD), behavioural dimension (BD) and cognitive dimension (CD). The regression output is indicated in the table below.

The regression equation was described as (*F(3,230)* =37.051, *p*<.001) with an R^2 of .326. The affective dimension and behavioural dimension were significant predictors of project success, however, the cognitive dimension was not a significant predictor of project success. The equation is depicted in Equation 7.

Equation 7: Equation for hypothesis 1

$$PS = 2.566 - 0.091\ (CD) + 0.312\ (BD) + 0.425\ (AD)$$

Source: Author's own research

The Durbin-Watson (DW) statistic indicated that no autocorrelation occurred in the analysis due to the fact that the value was between 1.5 and 2.5 (Field, 2013).

Research Hypothesis - Organisational energy aggregate

Research question one (RQ2): Can it be predicted with reasonable accuracy that a relationship exists between organisational energy (OE) and project success (PS)?

- **Null hypothesis one ($H_0$2):** No significant relationship exists between organisational energy (OE) and project success (PS).
- **Alternate hypothesis one ($H_1$2):** A significant relationship exists between organisational energy (OE) and project success (PS).

Table 40: Hypothesis 2 linear regression analysis

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics: R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.562[a]	.316	.313	.86307	.316	107.078	1	232	.000	2.163

a. Predictors: (Constant), OE_AVG

b. Dependent Variable: PS_AVG

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	**Regression**	79.760	1	79.760	107.078	.000[b]
	Residual	172.813	232	.745		
	Total	252.574	233			

a. Dependent Variable: PS_AVG

b. Predictors: (Constant), OE_AVG

Coefficients[a]

Model		Unstandardised Coefficients B	Unstandardised Coefficients Std. Error	Standardised Coefficients Beta	t	Sig.
1	**(Constant)**	2.518	.296		8.518	.000
	OE_AVG	.827	.080	.562	10.348	.000

Source: Author's own research

Using linear regression analysis, organisational energy predicted approximately 31.6% of the variance in project success. Linear regression testing was performed to predict project success based on organisational energy. The regression output is indicated in the table below. The regression equation was described as (*F(1,232)* = 107.078, *p*<.001), with an R^2 of .313. The equation is depicted in Equation 8.

Equation 8: Linear equation for hypothesis 2

$$PS = 2.518 + .827\ (OE)$$

Source: Author's own research

The Durbin-Watson (DW) statistic indicated that no autocorrelation occurred in the analysis due to the fact that the value was between 1.5 and 2.5 (Field, 2013).

5.6. Conclusion

The results from the chapter can be summarised in Table 41 as follows:

Table 41: Results summary

Hypothesis	Results	Relationship
H1a	• Null hypothesis rejected • Alternate hypothesis accepted	Postive and significant relationship
H1b	• Null hypothesis rejected • Alternate hypothesis accepted	Postive and significant relationship
H1c	• Failed to reject Null hypothesis • Alternate hypothesis rejected	No significant relationship
H2	• Null hypothesis rejected • Alternate hypothesis accepted	Postive and significant relationship

Source: Author's own research

- All the assumptions for factor analysis and regression analysis were met.

Detailed discussion and context in light of academic literature is provided in chapter 6.

6. DISCUSSION OF RESULTS

6.1. Introduction

The statistical testing results have been discussed in this chapter. The chapter is structured according to the four research hypotheses, and provides insights into the findings and whether this research has supported or contradicted the literature reviewed. The goal of this chapter was to ascertain whether a relationship exists between the proposed hypotheses as articulated in Chapter 3.

6.2. Demographic variables

The demographic variables were not used as control variables within the research question, however, it was imperative to discuss three noteworthy insights that were gleaned from the descriptive statistics. Firstly, the data indicated that most individuals within the sample were male. Secondly, white individuals were regarded as the dominant race in the sample. Lastly, a large portion of the respondents came from the mining industry.

Gender was primarily dominated by males at 64.1%, which was predicted. Pinto, Patanakul and Pinto (2017) observed gender bias related to the candidates observed technical competence within the project management profession, i.e. where the technical competence required was high, female candidates were preferred over male candidates, and vice versa. Henderson, Stackman and Koh (2013) also noted that female project managers continue to encounter gender-based marginalisation within the project environment, yet Pinto et al. (2017) observed that the number of women in project manager roles has increased over the past decade across multiple sectors.

The race distribution was mostly dominated by the white race. This may have been due to the fact that the mining industry was the dominant industry in the sample. The mining industry has been notorious for its lack of transformation and inability to achieve its employment equity targets (Heyns & Mostert, 2018).

Possible biases were identified that could have occurred due to the number of participants in the mining industry, which resulted in a 44% contribution. The possible reason for this selection bias may have been because the researcher was employed in the mining industry. The next section articulates the findings for the constructs.

6.3. Factor analysis discussion

In order to prevent repetition, common results have been presented upfront. The main reasons for the behavioural and cognitive dimensions not loading onto different variables relate to the fact that these factors were highly correlated, which is an indication that the constructs could have been measuring the same construct. A study by Alexiou et al. (2018) indicated that the best fit model was a second-order construct and not a first-order construct as measured in this study.

A study performed in South Africa by Cuff and Barkhuizen (2014) illustrated that a clear loading of items belonging to the behavioural and cognitive dimensions was not possible. This may have been due to the ambiguity of questions or items within the behavioural and cognitive measurement scales. Both these studies indicate that similar issues regarding the behavioural and cognitive construct were experienced when trying to test for reliability and the validity of the constructs.

The EFA results, specifically the KMO and Bartlett's test for sphericity, indicated that the dataset was appropriate for factor extraction and four components were extracted. This did not support the researcher's theoretical and conceptual model due to the fact that items PEM6 to PEM14 loaded onto a single factor instead of two separate factors, namely the behavioural dimension (PEM6 to PEM9) and the cognitive dimension (PEM10 to PEM14). The CFA test followed, and the SEM measurement model confirmed the EFA findings, illustrating that the items from the measurement scales did not load onto factors as anticipated. PEM1 to PEM5 loaded onto the affective dimension factor as anticipated, PEM6 to PEM9 did not load onto the behavioural dimension factor as expected, and PEM10 to PEM14 did not load onto the cognitive dimension as expected. PEM6 to PEM14 loaded onto a single factor. The measurement scales thus did not fully measure what was intended to be measured.

However, all CFA factor loading estimates from the SEM measurement model were significant and acceptable. Therefore the items measured the constructs at an acceptable level and could, therefore, be used in the analysis. All scales used had good reliability as computed by Cronbach's alpha and the Composite Reliability coefficients, i.e. questions in the survey contributed to the measurements. Both the SEM measurement model and the structural models achieved acceptable model fit. Therefore both models fit the dataset satisfactorily.

Other CFA results are discussed under each objective where it adds to the discussion. As the constructs are repeated in relationships, only the relevant CFA results will be discussed under that research objective. The specific validity concerns of organisational energy and project success will be discussed in objective 4, where the relationships between the constructs are analysed and interpreted. The focus, however, will be on the SEM structural model and the relationships set out in the research objectives and hypotheses.

6.4. Overview of constructs

Table 42 provides an indication of the constructs measured for the research project, the scales, reliability scores and mean scores from the research project. The reliability and mean scores were compared to academic literature.

Table 42: Overview of constructs and comparison to literature

Construct	Scales	Reliability scores	Mean scores
AD	• Five items • PEM1 – PEM5 • Factor loading>.70	• **CR=.774** • CR=.92 (Cuff & Barkhuizen, 2014)	• ***M*=3.40** • *M*=3.04 (Cuff & Barkhuizen, 2014)
BD	• Four items • PEM6 – PEM9 • Factor loading>.70	• **CR=.735** • CR=.83 (Cuff & Barkhuizen, 2014)	• ***M*=3.73** • *M*=3.28 (Cuff & Barkhuizen, 2014)
CD	• Five items • PEM10 – PEM14 • Factor loading>.70	• **CR=.723** • CR=.82 (Cuff & Barkhuizen, 2014)	• ***M*=3.79** • *M*=3.60 (Cuff & Barkhuizen, 2014)
OE (aggregate construct)	• 14 items • PEM1 – PEM14 • Factor loading>.70	• **CR=.935** • CR=.92 (Cuff & Barkhuizen, 2014) • CR=.90 (Alexiou et al., 2018)	• ***M*=3.63** • *M*=3.20 (Cuff & Barkhuizen, 2014) • *M*=4.10 (Alexiou et al., 2018)
PS	• 12 items • PSQ1 – PSQ12 • Factor loading>.70	• **CR=.949** • CR=.81 (Geoghegan & Dulewicz, 2008) • CR=.91 (Waller, 2015)	• ***M*=5.52** • *M*=5.60 (Waller, 2015)

Note: Reliability and mean scores from this research project have been depicted in bold typeface.
Source: Alexious et al. (2018); Cuff and Barkhuizen (2014); Geoghegan and Dulewicz (2008); Waller (2015)

The Composite Reliability test was conducted to test reliability of constructs. All constructs depicted good reliability (CR>.70) (Awang, 2014; Hair et al., 2010). High internal consistency was observed which suggested that the correct construct was being measured for all constructs (Zikmund et al., 2010). Construct validity was determined using factor analysis; all constructs displayed high factor loading with the exception of PEM14 with a factor loading of .52. PEM14 was not removed from the model as good model fit was still achieve with the inclusion of this item. The behavioural and cognitive dimension were highly correlated (r=.807) which was above the threshold (r<.70). The

EFA model loaded items for the behavioural dimension and cognitive dimension subscales onto one factor, which displayed reliability of 0.908.

Construct validity for the PSQ construct was determined using factor analysis; all 12 items displayed high factor loading and were included in the scale. The best fit for the data was a two-factor solution, however, the construct was used as an aggregate measure of project success, and the latent variables were not used in the study. The factor and principal component analyses of the PSQ were consistent with prior studies.

The mean scores across all constructs illustrate high levels of energy for all dimensions of organisational energy and the mean score for the project success construct illustrated high levels of project success. All constructs reliability and mean scores supported previous academic literature as per Table 42.

6.5. Research questions

6.5.1. Research question 1a

The research question and hypothesis has been depicted in section 3.3.1.1.

6.5.1.1. Interpretation of results

It is concluded that in this sample, the affective dimension has a positive and significant relationship ($p<.001$) with project success at a 95% confidence level.

The CFA of the affective dimension and project success showed no concerns with correlation, and the validity analysis was satisfactory. The CFA was thus satisfactory, and the constructs could be analysed in the SEM model.

The results of the research project are aligned with earlier research on related theory (Alexiou et al., 2018; Cuff & Barkhuizen, 2014); according to organisational energy theory, the higher an employee’s affective or emotional energy, the greater their aptitude to complete a project task (Chen et al., 2016). In global and South African studies, high affective or emotional energy was positively associated with increased performance or ability to achieve work-related tasks (Chen et al., 2016; Derman et al., 2011). A study performed in Pakistan within the construction industry also showed that emotional intelligence, which is a similar construct to affective dimension, had a positive relationship with project success (Sarwar et al., 2017).

In addition, a study that developed the interpersonal project leadership model by Allen, Carpenter, Dydak and Harkins (2016) articulated that project leaders should have the strong emotional maturity to accept new information and utilise that information to make themselves more self-aware and create stronger team cohesion. Leaders who are more self-aware and address employees emotional requirements will provide positive feedback and provide positive responses to social interactions that generate positive project outcomes. Dane and George (2014) explained that emotional energy is mostly studied in the present moment or over some past period, however, especially in the context of project work, forecasting of emotional energy must be considered due to promised rewards or promotions.

The academic literature stipulated suggests that affective energy which is characterised as the emotional state or the emotional well-being of an employee plays a vital role in the achievement of project deliverables or work tasks. The literature indicates that affective energy which has been measured in various forms and using different measurement scales, in various studies, has a significant and positive impact on positive project outcomes.

In a study conducted in the software development industry, researchers reported that cognitive ability explained the most variance in project success, and therefore was a much greater predictor of project success than emotional ability (Acikgoz et al., 2014). Emotional ability was regarded as the ability of the project manager to provide constructive appraisals and stimulate positive emotional responses in a team setting. Emotional ability is a similar construct to the affective dimension measured in this research project.

It is essential to note that drivers of project success are interconnected, i.e. they do not function alone. Examples of drivers that relate to an individual’s emotional state that have been reported in the project management literature include emotional maturity, emotional intelligence, interpersonal competence and relationships (Connolly & Reinicke, 2017; Glodstein, 2014; Huffman & Kilian, 2012), resilience (Mahmud, 2017), affective forecasting (Dane & George, 2014), employee psychology, self-awareness, and self-consciousness (Allen et al., 2016; Trejo, 2016).

6.5.2. Research question 1b

The research question and hypothesis has been depicted in section 3.3.1.2.

6.5.2.1. Interpretation of results

It is concluded that in this sample, the behavioural dimension has a positive and significant relationship (p<.001) with project success at a 95% confidence level.

The CFA of the behavioural dimension and project success showed some concerns of correlations. From these results, validity concerns were expected in the analysis. Validity analysis for the behavioural dimension and project success had some discriminate validity concerns. The theoretical insights of the research project with regards to these findings add to the discussion and now follow.

The high correlation between the behavioural and cognitive dimensions was expected by the researcher as academic literature had observed similar results. The items related to the behavioural and cognitive subscale loaded onto a single factor within the EFA. These constructs were assessed using existing multi-item scales, which were designed and tested to assess organisational energy and its subscales. A study performed by Alexiou et al. (2018) illustrated organisational energy produces the best model fit indices when measured as a second-order construct.

A study conducted on a South African sample highlighting the differences of organisational energy between African and white respondents indicated a difference in loading of items related to the behavioural subscale and cognitive subscale. For African respondents, PEM6 to PEM10 loaded onto the cognitive construct and PEM11 to PEM14 loaded onto the behavioural construct, while PEM6 to PEM8 loaded onto the cognitive construct and PEM9 to PEM12 loaded onto the behavioural construct. Clear loading of the items onto the behavioural and cognitive constructs did not follow the theoretical model, however, the factor correlations between the behavioural and cognitive constructs were acceptable (Cuff & Barkhuizen, 2014).

When conducting a similar study in the South African environment, Cuff and Barkhuizen (2014) identified that four items were challenging. PEM11 “People in my workgroup really care about the fate of this company” (Cole et al., 2012, p. 467) and PEM12 “People in my workgroup are always on the lookout for new opportunities” (Cole et al., 2012, p. 467) loaded on the behavioural construct instead of the cognitive construct. The link between "caring about the fate of the company" (Cole et al., 2012, p. 467) may not be clear in PEM9, and PEM10 can be seen to be unclear as it does not elucidate what kinds of opportunities are available. PEM8 "There has been a great deal of activity in my workgroup" (Cole et al., 2012, p. 467) and PEM9 "People in my workgroup are working at a very fast pace" (Cole et al., 2012, p. 467) loaded on the cognitive construct instead of the behavioural construct. This suggests that these four items should be rewritten to clearly communicate their meaning to respondents, which could assist with the clearer loading of items on their respective factors. Additional questions should be considered for the behavioural and cognitive dimensions that clarify the meaning of each factor (Cuff & Barkhuizen, 2014).

The results of the research project are aligned with earlier research on related theory (Alexiou et al., 2018; Cuff & Barkhuizen, 2014). The behavioural energy dimension is an action driver that generates productive organisational energy and teams contribute to attentive and conclusive behaviours to ensure that organisational and project objectives are achieved (Cole et al., 2012; Spreitzer et al., 2011).

In a recent international study, behavioural energy was seen to encourage teamwork amongst organisational members and augment their ability to complete project tasks (Han et al., 2016). In a similar study performed in South Africa, organisational energy was measured using the EnergyScapes Profile (ESP) scale. This scale measured the behavioural construct as a construct called the energy of activity, which showed a strong positive relationship with success organisations (Derman et al., 2011).

A recent study from Brazil also reported that entrepreneurial orientation has a positive and significant impact on project success (Martens et al., 2018). Entrepreneurial orientation is measured using five unobserved variables, namely autonomy, risk-taking, competitive aggressive, innovativeness, and proactiveness. All of these unobserved variables require or are related to physical energy. It is postulated by Martens, Machado, Martens, Silva and Frietas (2018) that entrepreneurs have high amounts of behavioural energy that lends itself to project success.

It is evident from the previous academic literature that a positive behaviour can assist in driving increased team energy and the ability of teams to pursue project deliverables. The behavioural modes of employees have been measured in various forms throughout the academic literature but the common theme is that good behavioural attributes in project managers and leadership have a strong link to project performance.

Organisational citizenship behaviour and helping behaviour are mediators in the link between bullying in the workplace and successful project outcomes (Creasy & Carnes, 2017). The study by Martens et al. (2018) and Creasy and Carnes (2017) indicate that behavioural energy and related constructs impact project dimension. Contrary to the above research, a study conducted by Bayiley and Teklu (2016) reported that intellectual capital, which is a similar construct to cognitive energy, is a highly important project success construct within international development projects in Ethiopia.

It is essential to note that drivers of project success are interconnected, i.e. they do not function alone. Examples of drivers that relate to an individual's behavioural energy that have been reported in the project management literature include organisational commitment (Oppong et al., 2017), organisational citizenship behaviour, and helping behaviour (Creasy & Carnes, 2017)

6.5.3. Research question 1c

The research question and hypothesis has been depicted in section 3.3.1.3.

6.5.3.1. Interpretation of results

It is concluded that in this sample, the cognitive dimension has no significant relationship (p>.05) with project success at a 95% confidence level.

The CFA of the cognitive dimension and project success showed some concerns of correlations. From these results, validity concerns were expected in the analysis, which are shown in Table 29. Validity analysis for the cognitive dimension and project success had some discriminate validity concerns. The theoretical insights of the research project with regards to these findings add to the discussion and now follow.

The high correlation between the cognitive and behavioural dimensions was expected by the researcher. As described in the previous interpretation of results regarding the behavioural construct, the items related to both the behavioural and cognitive dimensions loaded onto one factor. As per the previous conclusion, additional questions should be considered for the behavioural and cognitive dimensions that clarify the meaning of each factor (Cuff & Barkhuizen, 2014).

The outcome of this study contradicts previous research which indicated that the cognitive dimension has a positive impact on project success (Mazur, 2014). Cognitive energy stimulates intellectual systems and interactions that assist teams to solve problems collaboratively; the upside to this energy is that it resulted in more enthusiastic attitudes and improved organisational and project outcomes (Vogel & Bruch, 2011; Mazur, 2014). In two South African studies, organisational energy was measured using two different scales, namely the EnergyScapes Profile (ESP) and Productive Energy Measure (PEM) scale. Both scales measure cognitive energy and found a positive impact on organisational performance (Cuff & Barkhuizen, 2014; Derman et al., 2011). Within the ESP scale, cognitive energy was measured as the energy of control.

In a study conducted in Israel across three populations, it was reported that a prosocial environment allows for the release of cognitive energy such that employees are more innovative in the pursuit of solutions and are mentally alert (Russo, Shteigman, & Carmeli, 2015). In a study conducted in Taiwan on new product development (NPD) projects, results showed that the cognitive capabilities of project managers acted as a moderating variable and yielded improved NPD efficiency (Huang et al., 2015). Increased cognitive capabilities are regarded as an outcome of project managers who have created cognitive energy within a project team.

Contrary to the above research, a study conducted by Aretoulis, Papathanasiou, Zapounidis and Seridou (2017) reported that the conscientiousness dimension was the most desirable trait in an effective project manager. Their study classified seven traits of an effective project manager, including conscientiousness, skillsets, extraversion and amicability.

The research project concluded that the reason why a statistically significant relationship does not exist between cognitive energy and projects could be attributed to organisations perception that project management methodology is a standard technique that is enacted in the project environment and that no intellectual or mental capability is required to execute a project in these environments.

It is essential to note that drivers of project success are interconnected, i.e. they do not function alone. Examples of drivers that relate to an individual's cognitive energy that have been reported in project management literature include cognitive ability and cognitive capability (Aretoulis et al., 2017).

6.5.4. Research question 2

The research question and hypothesis has been depicted in section 3.3.2.2.

6.5.4.1. Interpretation of results

It is concluded that in this sample, that organisational energy has a positive and significant relationship (*p*<.001) with project success at a 95% confidence level.

The results of the research project are aligned to earlier research on related theory (Alexiou et al., 2018; Cross & Parker, 2004; Cuff & Barkhuizen, 2014; Han et al., 2016). In a study conducted by Strang (2011), which surveyed over 1,000 virtual team members in the US, it was reported that persuasive and believable leaders were considered energisers who elicit progress on projects. A study by Alexiou et al. (2018) indicated that organisation design affects the degree or intensity of an organisation's energy and in turn influences the effectiveness of employees.

Two South African studies further highlighted that organisational energy as measured by different scales (ESP and PEM) have a positive impact on organisational success or performance (Cuff & Barkhuizen, 2014; Derman et al., 2011). In a study performed by Cole et al. (2012), the authors reported that organisational energy and positive organisational outcomes are highly correlated.

Further, a study conducted amongst Chinese insurance companies illustrated that employees with high employee energy, a similar construct to organisational energy, display a characteristic termed plump wings, which epitomises the ability of an employee to complete task and actions efficiently and effectively (Chen et al., 2016). Welbourne (2014a; 2014b) stated that employee energy was regarded as an important dimension in the achievement of organisational performance improvement and innovation.

Various academic literature has measured organisational energy using PEM and EnergyScapes and a meaningful link has been observed to organisational performance and positive project outcomes. The academic literature has been conducted in multiple international contexts and has illustrated that organisational energy is a global phenomenon that impacts organisational performance. This research project has provided further evidence and validation that organisational energy has an impact on performance but specifically project performance.

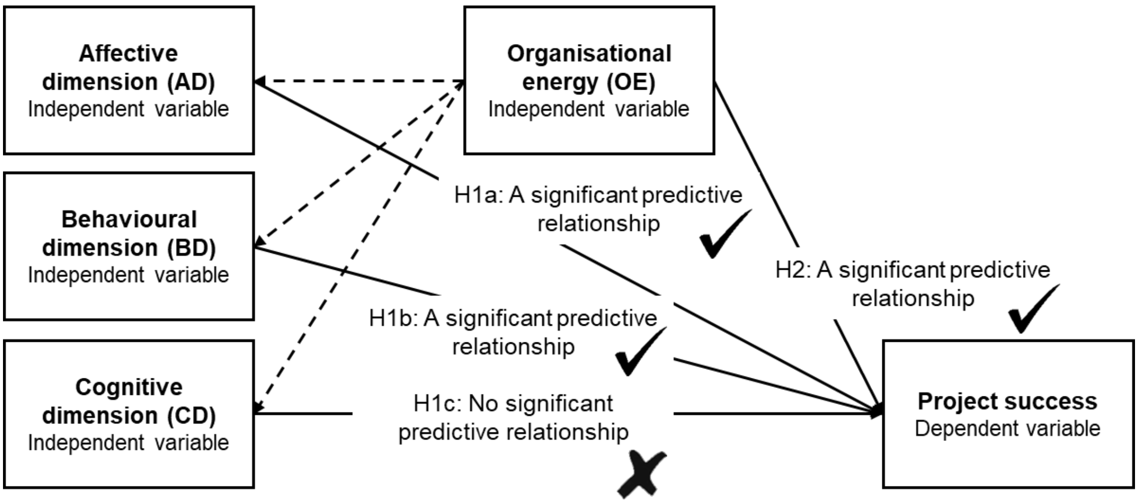
Contrary to the above, a study conducted by Cserhati and Szabo (2014) reported that success factors could be split into task focus and relationship orientation. This research suggested that relationship constructs such as communication, project leadership, and co-operation are more prominent in influencing project success in organisational event projects.

It is essential to note that drivers of project success are interconnected, i.e. they do not function alone. Examples of drivers that relate to the individual and team energy that have been reported in project management literature include organisational structure, organisational processes (Petro & Gardiner, 2018), reward and motivation philosophy, and culture (Golea & Balogh, 2015; Serrador et al., 2018)

6.6. Conclusion

Key objectives attained in this research project observed a positive and significant relationship between the affective energy, behavioural energy and organisational energy to predict project success. It was found that the cognitive dimension is not a statistically significant predictor of project success, regardless of the literature proposing that such a relationship exists. Valuable insights have thus been garnered from this study for future research studies. A summary of relationships is depicted in Figure 14.

Figure 14: Summary of findings



Source: Author’s own research

The literary contribution, management implications, limitations and future study recommendations are articulated in the final chapter.

7. CONCLUSION

7.1. Introduction

While reviewing the literature on organisations that implement successful projects, the author identified that affective, behavioural, and cognitive dimensions, are often referred to by researchers as an organisational factor.

7.1.1. Affective dimension

Project success was observed in the construction industry in Pakistan, where emphasis was placed on the emotional and psychological states of the project managers and their teams (Sarwar et al., 2017), however project success was also observed in a software development environment, where the biggest contributing factor was regarded as the cognitive ability of the project managers and their teams (Acikgoz et al., 2014). Given this, the research project wanted to understand whether a relationship existed between emotional or affective energy and project success.

7.1.2. Behavioural dimension

Project success was observed in South African companies that employed physically energetic project managers (Derman et al., 2011), however, the cognitive dimension was regarded as a most important factor in a study conducted in Ethiopian international development projects (Bayiley & Teklu, 2016). This led the research project to further investigate the relationship between behavioural energy and project success.

7.1.3. Cognitive dimension

The author noted that companies in Israel are well known for successful project implementation and that these organisations all have highly efficient and intellectually capable project managers (Russo et al., 2015). However, contrary to this, a study by Aretoulis et al. (2017) indicated that conscientiousness was the most desirable trait for an effective project manager. This led the research project to further investigate the relationship between cognitive energy and project success.

The prominence of organisational energy, its constructs and its impact on project success was quickly appreciated. The importance of this research was confirmed by literary scholars such as Adams (1984), Bruch and Vogel (2011), Cole et al. (2008), Cross et al. (2003), Fernandez-Perez et al. (2016), Schiuma et al. (2007), and Thayer (1989). This academic literature focused mainly on the influence of organisational energy on organisational success, sustainability, competitiveness and growth. Thus it encouraged leaders to energise their individual employees and teams and ensure that potential employees with the correct energy levels and states were employed into their organisations.

As more and more organisations move to a project environment and the benefits of embedding sound project management tools, techniques and principles become more crucial; the research project was perplexed to the reasons why research efforts had not been directed toward the impact of organisational energy, specifically individual and team energy on project success. The research project, therefore, examined the literature on top performing project organisations within the international and South African contexts.

A common theme started to emerge that most of these organisations had focused on improving their project success factors, specifically their organisational success factors, namely organisational structure, reward and motivation philosophy, and organisational culture, which created the breeding ground for the implementation of successful projects. One of these factors, i.e. organisational energy and its three constructs, were the focus of most managers and their teams in the achievement of improved performance.

A wealth of literature was available on the impact of organisational energy on organisational performance and certain constructs of organisational energy on project success, but no literature was available on organisational energy and its impact on project success. It was decided to determine whether a relationship, in fact, exists between organisational energy and project success, which is regarded as a means to achieving organisational success. The more successful projects an organisation implements, the greater the likelihood of organisational success.

These pertinent questions allowed for the development of key research objectives as highlighted in Section 1.3. The research hypotheses were developed based on these objectives as per Chapter 3.

Being an aspiring future programme or project director, it was anticipated that by achieving the research's goals and objectives, that the insights from the research project would determine the influence of organisational energy and its latent variables on project success. This will be vital for project directors and sponsors who wish to understand how they can energise their teams and individuals in their workplaces. Key factors have thus been identified and have made this study applicable to academics and organisations.

7.2. Principal findings

This research attempted to ascertain whether organisational energy and its constructs are significant predictors of project success. It was ascertained quantitatively that a positive relationship exists between organisational energy and project success, which supported the second hypothesis. The study added further knowledge and research to the organisational behaviour, employee engagement, employee energy and project success fields of study.

The research contributed to academic literature by ascertaining whether organisational energy and its latent constructs have an influence on project success within South African lead organisations. Cole et al.'s (2008) theory of organisational energy as well as Pinto and Slevin's (1987; 1988) theory of project success were used to determine whether a relationship exists. The study was aligned to the Productive Energy Measure (PEM) developed and modified by Cole et al. (2012), as well as the Project Success Questionnaire (PSQ) developed and modified by Pinto and Slevin (2006).

The research indicated that a significant positive relationship exists between the affective dimension and project success. Organisational culture and psychology literature provided support for the hypothesis, with affective energy being viewed as emotional arousal, positive exchanges in the work teams, and feelings such as eagerness, concentration and motivation toward project tasks (Cole et al., 2012). The finding was further affirmed by a study by Gallagher, Mazur and Ashkanasy (2015), who reported that employees with higher affective energy have more influence on a team. The first research question (1a) was thus confirmed, which proposed that a positive significant relationship exists between the affective dimension and project success.

The research indicated that a significant positive relationship exists between behavioural energy and project success. Organisational culture and psychology literature provided support for the hypothesis, with behavioural energy being viewed as an action driver of productive organisational energy to ensure that organisational and project objectives are achieved (Cole et al., 2012; Spreitzer et al., 2011). This finding was further vindicated by a study by Han et al. (2016), who reported that behavioural energy encourages team work amongst an organisation's members and augments their ability to complete project tasks. The first research question (1b) was thus confirmed, i.e. a positive significant relationship exists between the behavioural dimension and project success.

The research indicated that a significant positive relationship does not exist between cognitive energy and project success. Organisational culture and psychology literature provided support for the hypothesis, with cognitive energy being viewed as the intellectual processes and flows that permit team problem solving and seeking solutions (Vogel & Bruch, 2011). This finding was further justified by a study by Russo et al. (2015), who reported that a prosocial environment within the workplace releases cognitive energy so that employees are innovative in pursuing solutions, flexible and mentally alert. This relationship was not significant, however, the results assisted in understanding the relationship between cognitive energy and project success.

7.3. Implications for management

Businesses that want to effectively execute operational and strategic projects must ensure that their teams and individuals are being emotional, physically and mentally energised to attain their projects' goals and objectives (Cole et al., 2008). Recommendations to organisations with regard to how their project managers can energise their teams include sending project managers on training interventions that upskill project managers in energising teams; and create selection criteria related to organisational energy within the two energy dimensions, namely the affective and behavioural dimension, so as to improve project outcomes.

Within the academic world, a plethora of research literature is available regarding the association between organisational energy and organisational success, however, the relationship between organisational energy, its various latent constructs and project success is not well understood and statistically supported. This research thus serves to recommend development areas for current and future project managers who would like to implement successful projects. The section that follows provides recommendations to organisations on how the study can be used.

7.3.1. Energising project individuals and project teams

In light of project failures of key public and private projects in South Africa over the past 20 years, as well as these projects' inability to deliver proposed returns, it is more vital than ever that success factors for project management are researched and well understood to provide businesses with instruments and capabilities to create the fertile ground for projects to succeed (Trejo, 2016). To better understand whether teams and individuals are in an energised or de-energised state, survey instruments must be developed that measure organisational energy and its three energy dimensions.

This data must then be ingrained and entrenched in organisations' management information systems, which will assist management in understanding whether their employees are energised or de-energised. Interventions can then be put in place to address energy level issues, behaviours and actions that ultimately emanate from these energy states. Employee engagement must be distinguished from organisational energy; employee engagement surveys provide insights into how easily an organisation is willing to align with its guiding principles, while organisational energy refers to the internal force and ability of an employee to do work (Ahmed & Abdullabi, 2017).

Practically, a project manager or organisation can tailor their organisational infrastructure such as performance management systems, talent management systems, organisational structures and processes to promote organisational energy (Schiuma et al., 2007). For example, structures can be flattened to promote quicker decision-making cycles and can be continually improved to increase the speed of repetitive organisational tasks. These interventions ultimately have an infrastructure effect on improving organisational energy.

At a team level, energy can be created through organisational infrastructure that promotes quicker decision-making, disciplined execution, high-performance culture and continuous improvement, which has the ability to drive team energy. Management must ensure that teams are interacting socially in and out of the workplace, as these social interactions create affective transactions within the team and ultimately create trust. Culture creation workshops that provide teams with a clear understanding of the organisational values and culture are also vital to improving team energy, while individual energy is a vital energy catalyst for a team.

At an individual level, energy can be created through energisers within the organisation. These are individuals who are able to create positive energy within teams. These individuals are usually the most effective project managers, value creators or influencers. In order to find these energetic individuals, energy mapping can be used to identify an organisation's energisers. These energisers can then be deployed, if all other job criteria are achieved, to project management roles that allow for project success.

7.3.2. Awareness and training of project managers in organisational energy

Individual and team energy management can be taught or learned in much the same way as any other business skill or competency. Project managers must be made aware of the energy levels and states of their respective teams so as to manage them effectively. The better the project manager aligns to the organisational culture, the better his or her ability to energise his or her team.

The organisation must effectively communicate the vision, strategy and values to its project managers and their teams, and make all its employees aware of how their energy and behaviours can impact other employees, negatively and positively. Project managers must conduct organisational energy management training to better understand how best to energise their teams and ultimately improve performance. Mentoring and coaching of project managers is also necessary to understand which dimension of energy (affective and behavioural) needs to be improved in order for the project manager to provide balanced energy to their teams.

7.3.3. Selection criteria for project managers

Tools for measuring employee energy in the workplace on a more regular basis are vital for tailoring the organisational system and understanding when the organisation is in a de-energised state (Welbourne, 2014b). With a more precise understanding and measurement tool for organisational energy in place, an organisation can develop and implement processes to select the correct employees for projects, assist managers and staff with training on energy, implement team building, and general human resources management.

Energy criteria can be built into selection processes so that only employees above a certain energy threshold are selected for employment (Welbourne, 2014a; 2014b). Building organisational energy criteria into the selection process for project managers will be key to employing candidates with the correct energy levels and states, as is employing project managers who have the correct energy dimensionality. As an example, more well-defined project environments such as the construction environment might require project managers with high behavioural energy to execute fairly stock standard projects but within required timeframes.

In conclusion, it is vital that organisations, specifically within project environments, have project managers and teams that are energised at all times to achieve positive project outcomes. The energy dynamics and energy engine model give organisations business models to determine how these energies are created within organisations (Schiuma et al., 2007).

Energy dynamics also give organisations a clear indication that there is interplay between individual, team and organisational energies, with individual energies catalysing team energy and social interactions driving team energy. The energy performance chain indicates that the strategic context provides the setting for the creation and depletion of energy. Strategic context and its affiliated energy is driven by leadership and the organisational climate that is created and this assists in driving productivity (Schiuma et al., 2007).

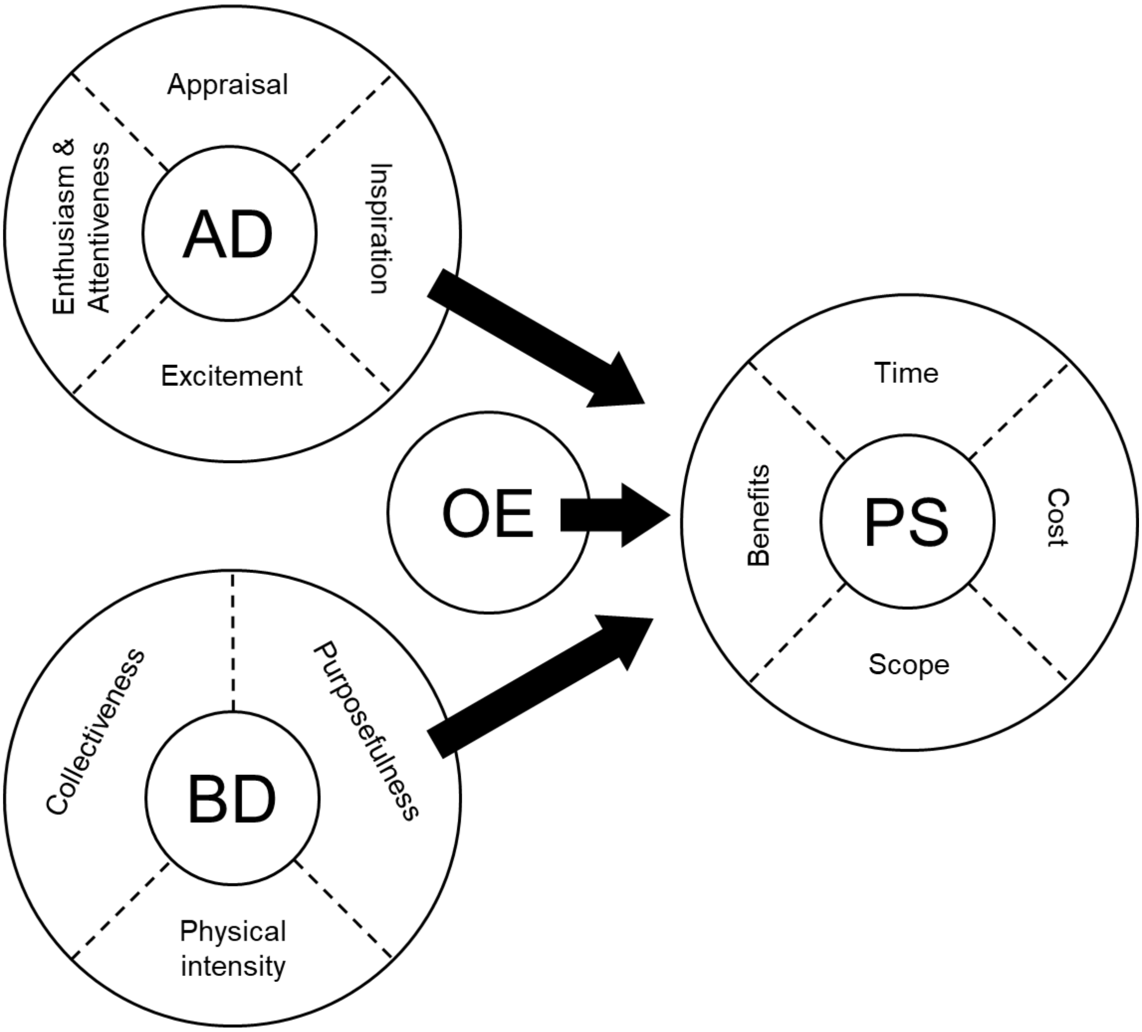
7.4. A proposed framework

This section presents a proposed model for energising teams and individuals to achieve successful project outcomes. These insights were obtained from the observations and findings of this research project. The energised project success model articulates the key project manager characteristics required to energise teams and assist in implementing successful projects.

The affective dimension (AD) characteristics that project managers must display in order to energise their teams toward positive project outcomes include the ability to provide a positive appraisal of team members' work; provide positive emotional responses to good performance; and be inspired, enthused and attentive to project-related tasks. The behavioural dimension (BD) characteristics that project managers must display in order to energise their teams toward positive project outcomes include the ability to work towards project deliverables collectively and purposefully. The project manager must also display intensity toward project tasks, giving the team an indication of the importance of tasks.

Taking on these characteristics will assist with the implementation of successful projects in terms of project success criteria including time deliverables, cost deliverables, scope deliverables, and customer benefit deliverables. Figure 15 indicates the proposed framework.

Figure 15: Energised Project Success Model



Source: Author's own research

7.5. Limitations of the research

Limitations can be defined as factors that impact research that cannot be controlled (Simon, 2011). All research has limitations, thus a researcher must understand these limitations and identify weaknesses that may influence the usefulness of the study (Creswell, 2012). Research topic, constructs and research design limitations were identified.

- A detailed analysis on project success factors, and specifically organisational success factors, showed that although organisational energy is an important attribute, many other organisational success factors namely organisational processes, reward, organisational structure, organisational culture, and motivation philosophy, and skillsets have an influence on project success. It was posited that a link exists between organisational energy and project success, however, many other organisational factors are predicators of project success (Simon, 2011).
- A researcher may develop an appropriate sampling plan, but it is dependent on the probability distribution of the data. Falsity in a proposition can occur if miscalculated (Schutt, 2015).
- Saunders et al. (2016) stipulated that research methodology forms the crux of the project. Limitations can occur in quantitative research within two phases the planning and execution phases.
- Mediation occurs as a result of an independent variable that impacts a non – observed mediator variables and ultimately impacts the dependent variable (Mackinnon, Fairchild, & Fritz, 2007). Mediating variables were not considered in this research project and could have impacted the relationship between the independent and dependent variables.
- Survivorship bias could have occurred that created sample bias. Survivorship bias is regarded as a phenomenon where the research project focused on respondents from environments that only conducted successful projects. The fact that the research project surveyed employees within businesses that were a going concern indicates that employees conducting unsuccessful projects were not surveyed.
- The research project used a deductive approach which assists the researcher to develop a hypothesis with the use of existing theory. It is argued that deductive research does not inspire divergent thinking and limits the scope of creativities

(Saunders et al., 2016).

- The environment in which the respondents answer questions is not controlled when using survey instruments. Accurate responses are highly dependent on the environment in which the respondent is answering the questionnaire (Baxter & Jack, 2008).
- This study was solely focussed on the South African context. Thus the findings are not generalisable to the international context. The sampling method resulted in most of the respondents coming from the mining industry, which may have affected the inferrability of the results to other industries.
- Time constraints limited the scope of the study that could be conducted, and the study could only provide a cross-sectional view of reality.
- The use of surveys can cause self-reporting errors due to respondents being too embarrassed to reveal specific details or be biased by an individual's mental state or feelings on the day (Saunders et al., 2016).
- Non-probability sampling technique was utilised in the research project and was regarded as a limitation. The reason for it being regarded as a limitation was that it could result in researcher bias and it is problematic to defend the generalisability and representativity of the sample to the population. For this reason, the results are not generalisable to employees who conduct projects in alternative industries.
- The factor analysis conducted in Chapter 5 indicated a high correlation between behavioural and cognitive energy, which could have been due to ambiguity between the items measuring each factor. This observation was established by research performed by Cuff and Barkhuizen (2014), however, the results were not regarded as a critical limitation. As much as the research found a connection between organisational energy and project success, it cannot be inferred that in the presence of high organisational energy, projects will be successfully implemented in organisations, i.e. this research project merely suggests a relationship, empirically.
- Cole et al. (2012) indicated that risk exists that a random measurement error could be introduced that could possibly negatively impact the reliability of constructs. Content deficiency was regarded as a limitation as a new measure was being developed.
- Cuff and Barkhuizen (2014) identified limitations related to cross-sectional research design, survey instrument, non – probability sampling technique, representativity and inadequate sample size.

- Derman et al. (2011) identified the lack of literature related to organisational energy and empirical research as a key limitation.

7.6. Recommendations for future research

The following recommendations for future research are advised:

- Future research sample populations should extend to include international organisations and businesses to provide a more global context.
- The use of random or probability sampling methods for the study may assist with the generalisability of the results or the use of different respondents in other industries to substantiate the current study and infer the results outside of the mining industry.
- A longitudinal research design will assist in determining developmental trends as the contexts of organisations change. It will also remove time-invariants and unobserved individual differences.
- The strong association between the behavioural and cognitive dimension constructs can be avoided by rewording the questions to clearly communicate their meanings to respondents. This could assist in clearer loading of items on their factors. Additional questions should be considered for the behavioural and cognitive dimensions that clarify the meaning of each factor (Cuff & Barkhuizen, 2014).
- The measurement scale for the Productive Energy Measure was a 5-point Likert scale, however, a 7-point may be more efficient. The 5-point Likert scale may also have reduced the SEM output precision (Schumacher & Lomax, 2004).
- Research that simultaneously studies other organisational project success factors will provide a more accurate picture of how organisational project success factors impact the successful implementation of projects. Therefore, organisational structure, organisational processes, organisational culture and reward and motivation philosophy can be added to the model as a construct for analysis.

7.7. Conclusion

Recent South African private and public sector project failures have placed immense strain on the economy and illustrated the vital need for improved project management understanding and expertise and the required success factors to achieve project success. Pinto and Slevin (2006) are regarded as the fathers of projects management and have reiterated over and over again the importance of project success factors and their impact on project success. With all this research being conducted into project success factors, the private and public sector still experience project failure on a massive scale.

A success factor that is not well – understood is organisational energy. In light of the current economy and the de-energised state that organisations are experiencing, it is pertinent that organisational energy and its latent constructs are better understood and organisations are re-energised at the individual, team and organisational level.

The literature illustrated that organisational energy is an important and renewable resource that is vital to the success of organisations (Alexiou et al., 2018; Cole et al., 2005; 2008; 2012; Cross & Parker, 2004). The research supported the key findings that organisational energy and has a positive impact on the successful implementation of projects.

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9. APPENDICES

Appendix A: Questionnaire

9/22/2018 MBA Research Survey

MBA Research Survey

* Required

Impact of individual and team energies on project success

Dear Sir/Madam

I am conducting research on the impact of organisational energy on the success of projects within organisations. To this end you are asked to complete a two – part survey on the level of organisational energy and the success of projects in your organisation. This will help us better understand the impacts of individual and team energy on the success of your projects. Your participation is voluntary, and you can withdraw at any time without penalty. Your participation is anonymous and only aggregated data will be reported. By completing the survey, you indicate that you voluntarily participate in this research. If you have any concerns, please contact either my supervisor or myself. Our details are provided below.

Researcher name: Gary – Jon Brown
Email: garyjon.brown8@gmail.com
Phone: 079 504 9394

Research Supervisor: Wynand Herbst
Email: wyherbst@gmail.com

Your details

1. **Age** *

____

2. **Gender** *
Mark only one oval.
- ◯ Female
- ◯ Male
- ◯ Prefer not to say
- ◯ Other: _______________

3. **Race** *
Mark only one oval.
- ◯ African
- ◯ White
- ◯ Indian
- ◯ Asian
- ◯ Mixed race
- ◯ Other

4. **Industry** *

____

https://docs.google.com/forms/d/1lfaDP-hFEnBqBRMMZ4OPFA8wSkv74IRm5Bqf9d87IG0/edit 1/5

5. **Job title** *

6. **Tenure** *
Number of years in employment within a project environment

7. **Project types** *
Mark only one oval.

- Capital and Infrastructure
- Information technology
- Process engineering or improvement
- Other:

Productive Organisational Energy Questionnaire

Judge how frequently each statement suits you.

8. *

Mark only one oval per row.

	Not at all	Once in a while	Sometimes	Fairly often	Frequently, if not always
1. People in my work group feel excited in their job					
2. People in my work group feel enthusiastic in their job					
3. People in my work group feel energetic in their job					
4. People in my work group feel inspired in their job					
5. People in my work group feel ecstatic in their job					
6. People in my work group go out of their way to ensure that company succeeds					
7. People in my work group often work extremely long hours without complaining					
8. There has been a great deal of activity in my work group					
9. People in my work group act at a very fast pace					
10. My work group is ready to act at any given time					
11. People in my work group are mentally alert					
12. In my work group, there is a collective desire to make something happen					
13. People in my work group really care about the fate of this company					
14. People in my work group are always on the lookout for new opportunities					

Project Success Questionnaire

Consider the statements below and rate each statement according to the degree to which you agree with the statement as it concerns your project or a project you recently completed.

9. *

Mark only one oval per row.

	Strongly disagree	Disagree	More or less disagree	Neutral	More or less agree	Agree	Strongly agree
1. This project has/will come in on schedule	⬭	⬭	⬭	⬭	⬭	⬭	⬭
2. This project has/will come in on budget	⬭	⬭	⬭	⬭	⬭	⬭	⬭
3. This project that has been developed works, (or if still being developed, looks as if it will work	⬭	⬭	⬭	⬭	⬭	⬭	⬭
4. Given the problem for which it was developed, this project seems to do the best job of solving that problem. i.e. it was the best choice among the set of alternatives	⬭	⬭	⬭	⬭	⬭	⬭	⬭
5. The results of this project represent a definite improvement in performance over the way client used to perform these activities	⬭	⬭	⬭	⬭	⬭	⬭	⬭
6. The project will be/is used by its intended clients	⬭	⬭	⬭	⬭	⬭	⬭	⬭
7. Important clients, directly affected by this project will make use of it	⬭	⬭	⬭	⬭	⬭	⬭	⬭
8. We are confident that non – technical start-up problems will be minimal because the project will be readily accepted by its intended users	⬭	⬭	⬭	⬭	⬭	⬭	⬭
9. I am/ was satisfied with the process by which this project is being/ was completed	⬭	⬭	⬭	⬭	⬭	⬭	⬭
10. This project has/will directly benefit the intended users: either through increasing efficiency or employee effectiveness	⬭	⬭	⬭	⬭	⬭	⬭	⬭

	Strongly disagree	Disagree	More or less disagree	Neutral	More or less agree	Agree	Strongly agree
11. Use of this project will directly lead to improved or more effective decision making or performance for the clients							
12. This project will have a positive impact on those who make use of it.							

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Appendix B: Measurement instruments

Table 43: Measurement instruments – Productive Energy Measure

Factor	Item	Question
Affective dimension	PEM1	"People in my work group feel excited in the job" (Cole et al., 2012, p. 467)
	PEM2	"People in my work group feel enthusiastic in their job" (Cole et al., 2012, p. 467)
	PEM3	"People in my work group feel energetic in their job" (Cole et al., 2012, p. 467)
	PEM4	"People in my work group feel inspired in their job" (Cole et al., 2012, p. 467)
	PEM5	"People in my work group feel ecstatic in their job" (Cole et al., 2012, p. 467)
Behavioural dimension	PEM6	"People in my work group go out of their way to ensure that company succeeds" (Cole et al., 2012, p. 467)
	PEM7	"People in my work group often work extremely long hours without complaining" (Cole et al., 2012, p. 467)
	PEM8	"There has been a great deal of activity in my work group" (Cole et al., 2012, p. 467)
	PEM9	"People in my work group act at a very fast pace" (Cole et al., 2012, p. 467)
Cognitive dimension	PEM10	"My work group is ready to act at any given time" (Cole et al., 2012, p. 467)
	PEM11	"People in my work group are mentally alert" (Cole et al., 2012, p. 467)
	PEM12	"In my work group, there is a collective desire to make something happen" (Cole et al., 2012, p. 467)
	PEM13	"People in my work group really care about the fate of this company" (Cole et al., 2012, p. 467)
	PEM14	"People in my work group are always on the lookout for new opportunities" (Cole et al., 2012, p. 467)

Source: Cole, Bruch and Vogel (2012)

Table 44: Measurement instruments – Project Success Questionnaire

Factor	Item	Question
Project dimension	PSQ1	"This project has/will come in on schedule" (Pinto & Slevin, 1988, p. 72)
	PSQ2	"This project has/will come in on budget" (Pinto & Slevin, 1988, p. 72)
	PSQ3	"This project that has been developed works, (or if still being developed, looks as if it will work" (Pinto & Slevin, 1988, p. 72)
	PSQ4	"Given the problem for which it was developed, this project seems to do the best job of solving that problem. i.e. it was the best choice among the set of alternatives" (Pinto & Slevin, 1988, p. 72)
	PSQ5	"The results of this project represent a definite improvement in performance over the way client used to perform these activities" (Pinto & Slevin, 1988, p. 72)
Client dimension	PSQ6	"The project will be/is used by its intended clients" (Pinto & Slevin, 1988, p. 72)
	PSQ7	"Important clients directly affected by this project will make use of it" (Pinto & Slevin, 1988, p. 72)
	PSQ8	"We are confident that non – technical start-up problems will be minimal because the project will be readily accepted by its intended users" (Pinto & Slevin, 1988, p. 72)
	PSQ9	"I am/ was satisfied with the process by which this project is being/ was completed" (Pinto & Slevin, 1988, p. 72)
	PSQ10	"This project has/will directly benefit the intended users: either through increasing efficiency or employee effectiveness" (Pinto & Slevin, 1988, p. 72)
	PSQ11	"Use of this project will directly lead to improved or more effective decision-making or performance for the clients" (Pinto & Slevin, 1988, p. 72)
	PSQ12	"This project will have a positive impact on those who make use of it" (Pinto & Slevin, 1988, p. 72)

Source: Pinto and Slevin (1988)

Appendix C: Ethical clearance approval

Figure 16: Ethical clearance approval

Gordon Institute of Business Science
University of Pretoria

14 June 2018

Brown Gary-Jon

Dear Gary-Jon

Please be advised that your application for Ethical Clearance has been approved.

You are therefore allowed to continue collecting your data.

Please note that approval is granted based on the methodology and research instruments provided in the application. If there is any deviation change or addition to the research method or tools, a supplementary application for approval must be obtained

We wish you everything of the best for the rest of the project.

Kind Regards

GIBS MBA Research Ethical Clearance Committee

Appendix D: Quantitative reports

Table 45: Item descriptive statistics

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
PEM1	234	1	5	3.62	.891	-.421	.159	-.050	.317
PEM2	234	1	5	3.60	.945	-.361	.159	-.242	.317
PEM3	234	1	5	3.54	.865	-.240	.159	-.039	.317
PEM4	234	1	5	3.40	.940	-.309	.159	-.244	.317
PEM5	234	1	5	2.82	.926	.127	.159	.017	.317
PEM6	234	1	5	3.75	1.035	-.612	.159	-.217	.317
PEM7	234	1	5	3.58	1.082	-.559	.159	-.276	.317
PEM8	234	1	5	3.92	.909	-.711	.159	.165	.317
PEM9	234	1	5	3.65	.996	-.485	.159	-.291	.317
PEM10	234	1	5	3.75	1.024	-.471	.159	-.490	.317
PEM11	234	2	5	3.92	.853	-.472	.159	-.355	.317
PEM12	234	1	5	3.91	.917	-.654	.159	.173	.317
PEM13	234	1	5	3.89	.983	-.623	.159	-.460	.317
PEM14	234	1	5	3.50	1.077	-.291	.159	-.632	.317
PSQ1	234	1	7	5.08	1.589	-.923	.159	.078	.317
PSQ2	234	1	7	4.94	1.668	-.768	.159	-.344	.317
PSQ3	234	1	7	5.63	1.216	-1.378	.159	2.015	.317
PSQ4	234	1	7	5.53	1.212	-1.233	.159	1.761	.317
PSQ5	234	1	7	5.69	1.204	-1.203	.159	1.587	.317
PSQ6	234	1	7	5.82	1.141	-1.332	.159	2.264	.317
PSQ7	234	1	7	5.86	1.143	-1.478	.159	2.777	.317
PSQ8	234	1	7	5.10	1.328	-.826	.159	.448	.317
PSQ9	234	1	7	5.21	1.385	-1.017	.159	.624	.317
PSQ10	234	1	7	5.74	1.197	-1.386	.159	2.296	.317
PSQ11	234	1	7	5.68	1.205	-1.343	.159	2.085	.317
PSQ12	234	1	7	5.96	1.191	-1.784	.159	3.663	.317
Valid N (listwise)	234								

Source: Author's own research

Table 46: Curve estimation for the affective dimension

Model Summary and Parameter Estimates

Dependent Variable: AD_AVG

Equation	Model Summary					Parameter Estimates			
	R Square	F	df1	df2	Sig.	Constant	b1	b2	b3
Linear	.277	88.806	1	232	.000	1.183	.401		
Logarithmic	.223	66.552	1	232	.000	.841	1.518		
Inverse	.130	34.804	1	232	.000	4.141	-3.853		
Quadratic	.297	48.890	2	231	.000	2.628	-.257	.069	
Cubic	.315	35.236	3	230	.000	5.197	-2.368	.581	-.038
Compound	.268	85.036	1	232	.000	1.600	1.140		
Power	.219	65.088	1	232	.000	1.423	.498		
S	.129	34.228	1	232	.000	1.436	-1.267		
Growth	.268	85.036	1	232	.000	.470	.131		
Exponential	.268	85.036	1	232	.000	1.600	.131		
Logistic	.268	85.036	1	232	.000	.625	.877		

The independent variable is PS_AVG.

Source: Author's own research

Table 47: Curve estimation for the behavioural dimension

Model Summary and Parameter Estimates

Dependent Variable: BD_AVG

Equation	Model Summary					Parameter Estimates			
	R Square	F	df1	df2	Sig.	Constant	b1	b2	b3
Linear	.276	88.275	1	232	.000	1.487	.407		
Logarithmic	.248	76.457	1	232	.000	.993	1.626		
Inverse	.182	51.676	1	232	.000	4.624	-4.626		
Quadratic	.280	44.898	2	231	.000	2.157	.101	.032	
Cubic	.280	29.828	3	230	.000	1.898	.314	-.019	.004
Compound	.280	90.108	1	232	.000	1.815	1.134		
Power	.268	84.917	1	232	.000	1.517	.518		
S	.215	63.407	1	232	.000	1.586	-1.539		
Growth	.280	90.108	1	232	.000	.596	.126		
Exponential	.280	90.108	1	232	.000	1.815	.126		
Logistic	.280	90.108	1	232	.000	.551	.882		

The independent variable is PS_AVG.

Source: Author's own research

Table 48: Curve estimation of the cognitive dimension

Model Summary and Parameter Estimates

Dependent Variable: CD_AVG

	Model Summary					Parameter Estimates			
Equation	R Square	F	df1	df2	Sig.	Constant	b1	b2	b3
Linear	.195	56.147	1	232	.000	1.994	.328		
Logarithmic	.175	49.153	1	232	.000	1.599	1.309		
Inverse	.125	33.141	1	232	.000	4.513	-3.674		
Quadratic	.196	28.196	2	231	.000	2.356	.163	.017	
Cubic	.200	19.131	3	230	.000	3.474	-.756	.240	-.017
Compound	.203	59.130	1	232	.000	2.152	1.104		
Power	.193	55.573	1	232	.000	1.873	.407		
S	.149	40.722	1	232	.000	1.541	-1.186		
Growth	.203	59.130	1	232	.000	.766	.099		
Exponential	.203	59.130	1	232	.000	2.152	.099		
Logistic	.203	59.130	1	232	.000	.465	.906		

The independent variable is PS_AVG.

Source: Author’s own research

Table 49: Curve estimation of organisational energy

Model Summary and Parameter Estimates

Dependent Variable: OE_AVG

	Model Summary					Parameter Estimates			
Equation	R Square	F	df1	df2	Sig.	Constant	b1	b2	b3
Linear	.316	107.078	1	232	.000	1.523	.382		
Logarithmic	.273	86.905	1	232	.000	1.112	1.497		
Inverse	.184	52.191	1	232	.000	4.420	-4.078		
Quadratic	.325	55.594	2	231	.000	2.382	-.009	.041	
Cubic	.329	37.640	3	230	.000	3.527	-.950	.269	-.017
Compound	.311	104.737	1	232	.000	1.863	1.124		
Power	.280	90.069	1	232	.000	1.616	.468		
S	.198	57.368	1	232	.000	1.521	-1.308		
Growth	.311	104.737	1	232	.000	.622	.117		
Exponential	.311	104.737	1	232	.000	1.863	.117		
Logistic	.311	104.737	1	232	.000	.537	.890		

The independent variable is PS_AVG.

Source: Author’s own research

Table 50: Multicollinearity tests

Coefficients[a]

Model		Unstandardised Coefficients B	Unstandardised Coefficients Std. Error	Standardised Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	.678	.196		3.455	.001		
	BD_AVG	.400	.079	.406	5.082	.000	.361	2.773
	CD_AVG	.323	.082	.314	3.934	.000	.361	2.773

a. Dependent Variable: AD_AVG

Coefficients[a]

Model		Unstandardised Coefficients B	Unstandardised Coefficients Std. Error	Standardised Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	.753	.148		5.080	.000		
	BD_AVG	.641	.049	.668	13.164	.000	.568	1.762
	AD_AVG	.195	.049	.200	3.934	.000	.568	1.762

a. Dependent Variable: CD_AVG

Coefficients[a]

Model		Unstandardised Coefficients B	Unstandardised Coefficients Std. Error	Standardised Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	.332	.158		2.097	.037		
	AD_AVG	.252	.050	.248	5.082	.000	.591	1.691
	CD_AVG	.669	.051	.641	13.164	.000	.591	1.691

a. Dependent Variable: BD_AVG

Source: Author's own research

Table 51: EFA Cronbach's alpha results

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if Item Deleted
PEM1	13.36	10.198	.834	.712	.891
PEM2	13.38	9.953	.821	.711	.893
PEM3	13.44	10.591	.783	.624	.902
PEM4	13.59	9.986	.820	.680	.894
PEM5	14.16	10.674	.696	.502	.919

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if Item Deleted
PEM6	30.12	35.579	.737	.568	.894
PEM7	30.29	36.523	.615	.414	.904
PEM8	29.94	38.078	.610	.408	.903
PEM9	30.22	35.811	.750	.618	.894
PEM10	30.12	35.411	.762	.637	.892
PEM11	29.95	37.414	.729	.570	.896
PEM12	29.96	36.552	.753	.601	.894
PEM13	29.98	35.712	.772	.637	.892
PEM14	30.37	37.950	.500	.264	.913

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if Item Deleted
PSQ1	4.94	2.782	.822	.676	.
PSQ2	5.08	2.526	.822	.676	.

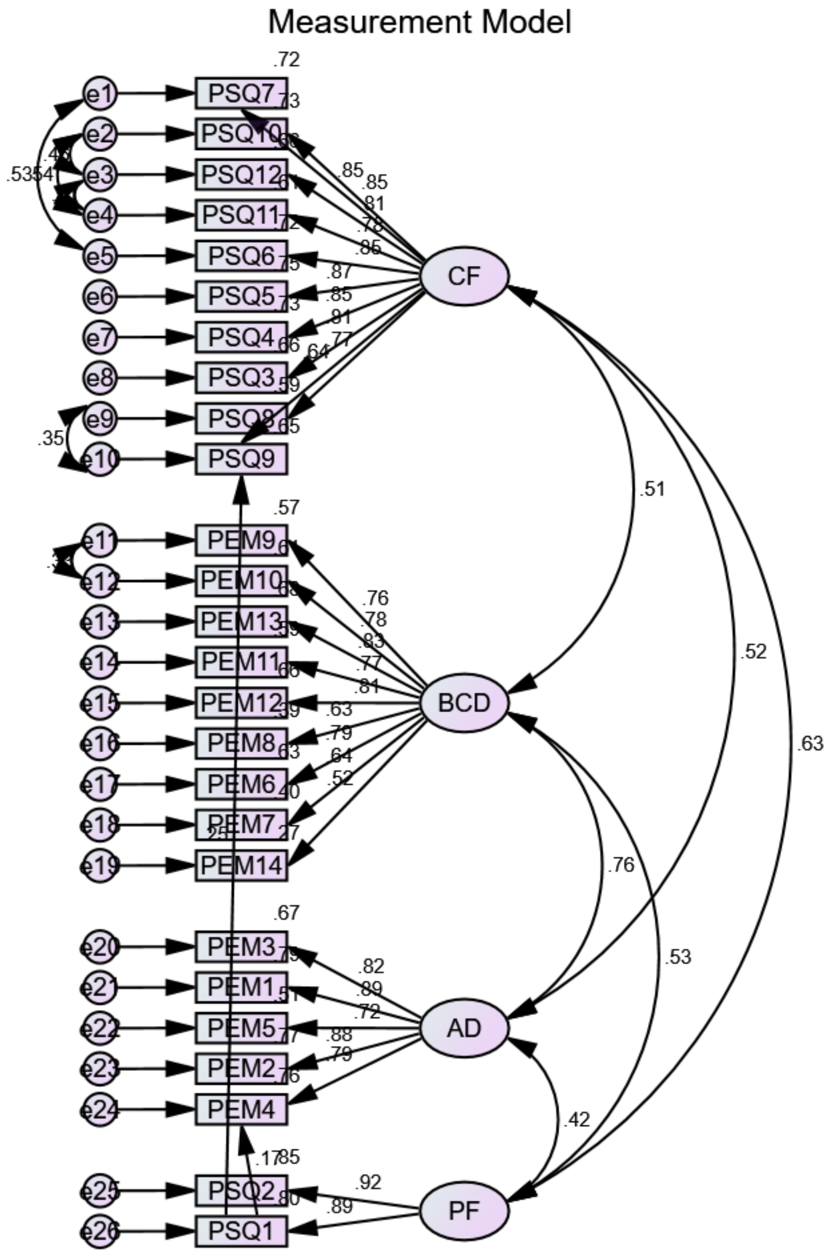
Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if Item Deleted
PSQ3	50.59	88.458	.778	.632	.953
PSQ4	50.68	87.668	.819	.689	.951
PSQ5	50.53	87.521	.833	.712	.951
PSQ6	50.40	88.430	.839	.794	.951
PSQ7	50.36	88.205	.849	.810	.950
PSQ8	51.12	87.333	.751	.629	.955

PSQ9	51.01	86.318	.758	.654	.955
PSQ10	50.48	86.929	.868	.814	.950
PSQ11	50.53	88.070	.805	.761	.952
PSQ12	50.26	87.925	.823	.774	.951

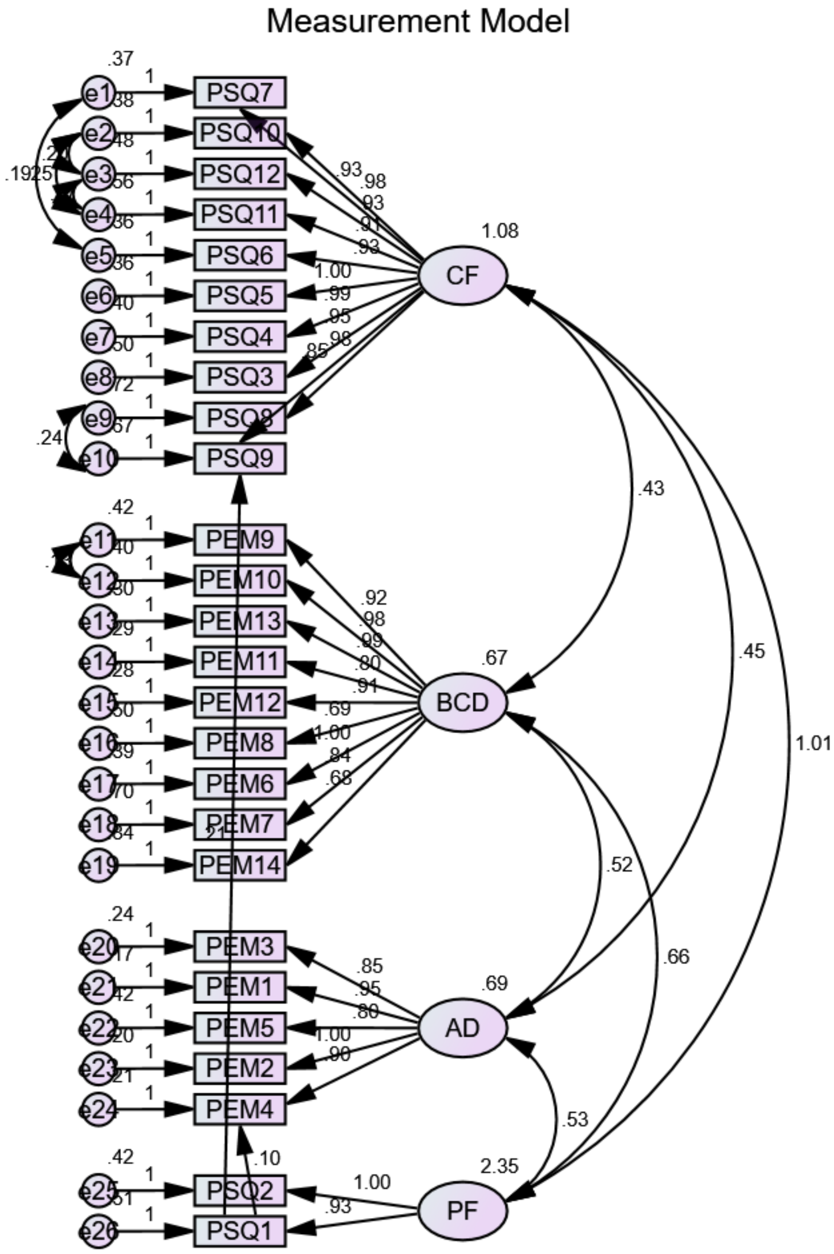
Source: Author's own research

Figure 17: Detailed measurement model with standardised estimates



Source: Author's own research

Figure 18: Measurement model with unstandardised estimates



Source: Author's own research

Table 52: Measurement model unstandardised regression weights

			Estimate	S.E.	C.R.	P	Label
PSQ1	<---	ProjectFactor	.925	.060	15.391	***	par_22
PSQ7	<---	ClientFactor	.929	.054	17.162	***	par_1
PSQ10	<---	ClientFactor	.981	.056	17.423	***	par_2
PSQ12	<---	ClientFactor	.928	.058	15.874	***	par_3
PSQ11	<---	ClientFactor	.905	.061	14.900	***	par_4
PSQ6	<---	ClientFactor	.930	.054	17.241	***	par_5
PSQ5	<---	ClientFactor	1.000				
PSQ4	<---	ClientFactor	.991	.057	17.384	***	par_6
PSQ3	<---	ClientFactor	.949	.059	15.975	***	par_7

			Estimate	S.E.	C.R.	P	Label
PSQ8	<---	ClientFactor	.976	.068	14.445	***	par_8
PSQ9	<---	ClientFactor	.847	.073	11.612	***	par_9
PEM9	<---	BehaviouralDimension	.915	.073	12.546	***	par_10
PEM10	<---	BehaviouralDimension	.975	.074	13.160	***	par_11
PEM13	<---	BehaviouralDimension	.988	.070	14.139	***	par_12
PEM11	<---	BehaviouralDimension	.799	.062	12.902	***	par_13
PEM12	<---	BehaviouralDimension	.906	.066	13.832	***	par_14
PEM8	<---	BehaviouralDimension	.693	.069	10.012	***	par_15
PEM6	<---	BehaviouralDimension	1.000				
PEM7	<---	BehaviouralDimension	.836	.082	10.169	***	par_16
PEM14	<---	BehaviouralDimension	.682	.084	8.088	***	par_17
PEM3	<---	AffectiveDimension	.854	.052	16.432	***	par_18
PEM1	<---	AffectiveDimension	.952	.050	19.086	***	par_19
PEM5	<---	AffectiveDimension	.796	.061	13.065	***	par_20
PEM2	<---	AffectiveDimension	1.000				
PEM4	<---	AffectiveDimension	.897	.054	16.525	***	par_21
PSQ2	<---	ProjectFactor	1.000				
PSQ9	<---	PSQ1	.214	.040	5.392	***	par_35
PEM4	<---	PSQ1	.102	.023	4.434	***	par_36

Source: Author’s own research

Table 53: Measurement model standardised regression weights

			Estimate
PSQ1	<---	ProjectFactor	.894
PSQ7	<---	ClientFactor	.848
PSQ10	<---	ClientFactor	.855
PSQ12	<---	ClientFactor	.812
PSQ11	<---	ClientFactor	.783
PSQ6	<---	ClientFactor	.850
PSQ5	<---	ClientFactor	.866
PSQ4	<---	ClientFactor	.853
PSQ3	<---	ClientFactor	.814
PSQ8	<---	ClientFactor	.767
PSQ9	<---	ClientFactor	.639
PEM9	<---	BehaviouralDimension	.756
PEM10	<---	BehaviouralDimension	.784
PEM13	<---	BehaviouralDimension	.827
PEM11	<---	BehaviouralDimension	.771
PEM12	<---	BehaviouralDimension	.813
PEM8	<---	BehaviouralDimension	.627
PEM6	<---	BehaviouralDimension	.795
PEM7	<---	BehaviouralDimension	.635
PEM14	<---	BehaviouralDimension	.521
PEM3	<---	AffectiveDimension	.821
PEM1	<---	AffectiveDimension	.888
PEM5	<---	AffectiveDimension	.715
PEM2	<---	AffectiveDimension	.880
PEM4	<---	AffectiveDimension	.793
PSQ2	<---	ProjectFactor	.920
PSQ9	<---	PSQ1	.246
PEM4	<---	PSQ1	.173

Source: Author’s own research

Table 54: Measurement model covariance

			Estimate	S.E.	C.R.	P	Label
ClientFactor	<-->	BehaviouralDimension	.431	.071	6.044	***	par_23
ClientFactor	<-->	AffectiveDimension	.452	.071	6.381	***	par_24
ClientFactor	<-->	ProjectFactor	1.011	.139	7.287	***	par_25
BehaviouralDimension	<-->	AffectiveDimension	.517	.066	7.801	***	par_26
BehaviouralDimension	<-->	ProjectFactor	.662	.107	6.200	***	par_27
AffectiveDimension	<-->	ProjectFactor	.530	.100	5.282	***	par_28
e1	<-->	e5	.193	.033	5.805	***	par_29
e2	<-->	e4	.250	.041	6.101	***	par_30
e3	<-->	e4	.267	.044	6.032	***	par_31
e9	<-->	e10	.244	.053	4.554	***	par_32
e11	<-->	e12	.135	.033	4.038	***	par_33
e2	<-->	e3	.197	.037	5.258	***	par_34

Source: Author's own research

Table 55: Measurement model correlations

			Estimate
ClientFactor	<-->	BehaviouralDimension	.505
ClientFactor	<-->	AffectiveDimension	.524
ClientFactor	<-->	ProjectFactor	.634
BehaviouralDimension	<-->	AffectiveDimension	.759
BehaviouralDimension	<-->	ProjectFactor	.527
AffectiveDimension	<-->	ProjectFactor	.417
e1	<-->	e5	.531
e2	<-->	e4	.539
e3	<-->	e4	.514
e9	<-->	e10	.350
e11	<-->	e12	.327
e2	<-->	e3	.458

Source: Author's own research

Table 56: Measurement model variances

	Estimate	S.E.	C.R.	P	Label
ClientFactor	1.082	.132	8.225	***	par_37
BehaviouralDimension	.674	.094	7.144	***	par_38
AffectiveDimension	.688	.082	8.405	***	par_39
ProjectFactor	2.346	.280	8.377	***	par_40
e26	.506	.112	4.524	***	par_41
e1	.366	.040	9.062	***	par_42
e2	.385	.043	8.988	***	par_43
e3	.481	.051	9.442	***	par_44
e4	.561	.058	9.667	***	par_45
e5	.360	.040	9.036	***	par_46
e6	.361	.041	8.860	***	par_47
e7	.399	.044	9.072	***	par_48
e8	.497	.052	9.534	***	par_49
e9	.723	.073	9.852	***	par_50
e10	.671	.067	9.998	***	par_51
e11	.424	.044	9.561	***	par_52
e12	.402	.043	9.349	***	par_53
e13	.305	.034	8.929	***	par_54
e14	.294	.031	9.533	***	par_55
e15	.284	.031	9.110	***	par_56

	Estimate	S.E.	C.R.	P	Label
e16	.499	.049	10.238	***	par_57
e17	.393	.042	9.314	***	par_58
e18	.695	.068	10.213	***	par_59
e19	.843	.080	10.476	***	par_60
e20	.243	.026	9.188	***	par_61
e21	.167	.021	7.867	***	par_62
e22	.417	.042	9.989	***	par_63
e23	.201	.025	8.100	***	par_64
e24	.211	.024	8.723	***	par_65
e25	.425	.125	3.396	***	par_66

Source: Author's own research

Table 57: Measurement model square multiple correlations

	Estimate
PSQ1	.799
PSQ2	.847
PEM4	.760
PEM2	.774
PEM5	.511
PEM1	.788
PEM3	.674
PEM14	.271
PEM7	.404
PEM6	.632
PEM8	.393
PEM12	.661
PEM11	.594
PEM13	.683
PEM10	.614
PEM9	.571
PSQ9	.648
PSQ8	.588
PSQ3	.662
PSQ4	.727
PSQ5	.750
PSQ6	.722
PSQ11	.613
PSQ12	.660
PSQ10	.730
PSQ7	.719

Source: Author's own research

Table 58: Measurement model - Cronbach's alpha

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if Item Deleted
PEM1	13.36	10.198	.834	.712	.891
PEM2	13.38	9.953	.821	.711	.893
PEM3	13.44	10.591	.783	.624	.902
PEM4	13.59	9.986	.820	.680	.894
PEM5	14.16	10.674	.696	.502	.919

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if Item Deleted
PEM6	30.12	35.579	.737	.568	.894
PEM7	30.29	36.523	.615	.414	.904
PEM8	29.94	38.078	.610	.408	.903
PEM9	30.22	35.811	.750	.618	.894
PEM10	30.12	35.411	.762	.637	.892
PEM11	29.95	37.414	.729	.570	.896
PEM12	29.96	36.552	.753	.601	.894
PEM13	29.98	35.712	.772	.637	.892
PEM14	30.37	37.950	.500	.264	.913

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if Item Deleted
PSQ1	4.94	2.782	.822	.676	.
PSQ2	5.08	2.526	.822	.676	.

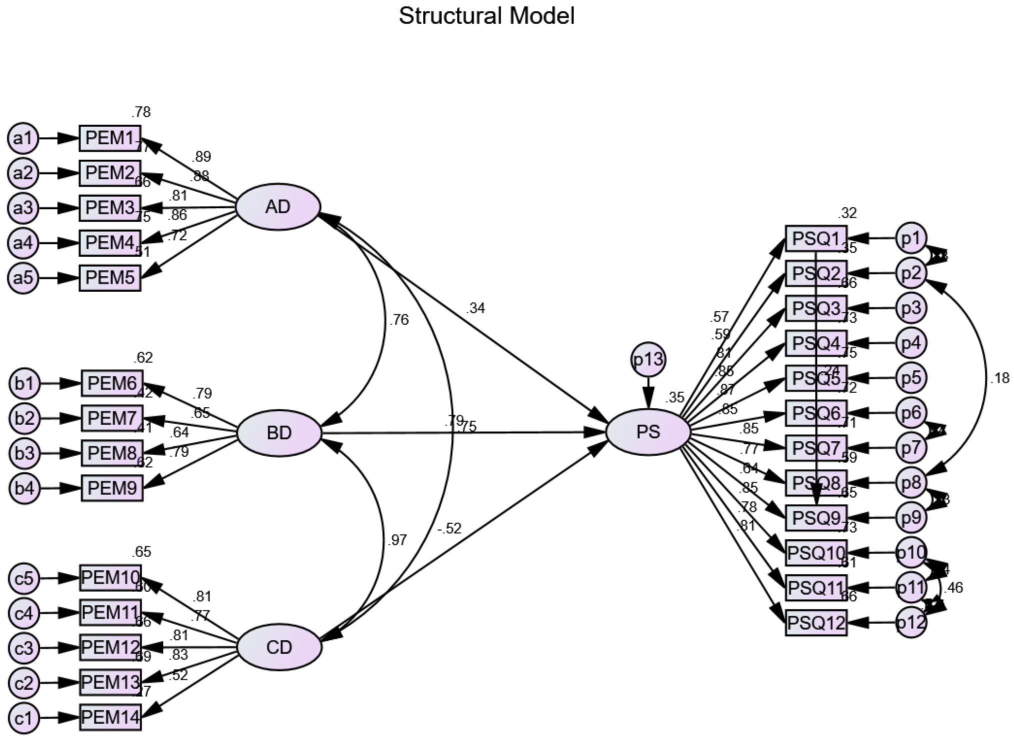
Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if Item Deleted
PSQ3	50.59	88.458	.778	.632	.953
PSQ4	50.68	87.668	.819	.689	.951
PSQ5	50.53	87.521	.833	.712	.951
PSQ6	50.40	88.430	.839	.794	.951
PSQ7	50.36	88.205	.849	.810	.950
PSQ8	51.12	87.333	.751	.629	.955

PSQ9	51.01	86.318	.758	.654	.955
PSQ10	50.48	86.929	.868	.814	.950
PSQ11	50.53	88.070	.805	.761	.952
PSQ12	50.26	87.925	.823	.774	.951

Source: Author's own research

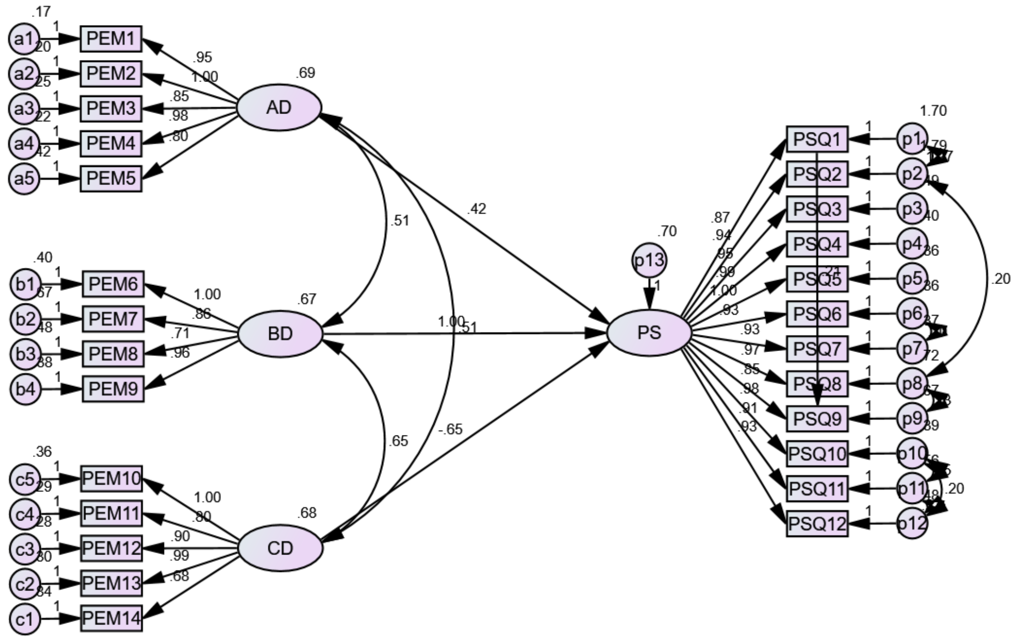
Figure 19: Detailed structural model with standardised estimates



Source: Author's own research

Figure 20: Detailed structural model with unstandardised estimates

Structural Model



Source: Author's own research

Table 59: Structural unstandardised regression weights

			Estimate	S.E.	C.R.	P	Label
ProjectSuccess	<---	AffectiveDimension	.422	.134	3.137	.002	par_23
ProjectSuccess	<---	BehaviouralDimension	1.000				
ProjectSuccess	<---	CognitiveDimension	-.650	.143	-4.533	***	par_24
PSQ1	<---	ProjectSuccess	.870	.092	9.502	***	par_15
PEM1	<---	AffectiveDimension	.951	.050	18.970	***	par_1
PEM2	<---	AffectiveDimension	1.000				
PEM3	<---	AffectiveDimension	.848	.052	16.174	***	par_2
PEM4	<---	AffectiveDimension	.980	.054	18.097	***	par_3
PEM5	<---	AffectiveDimension	.800	.061	13.104	***	par_4
PEM6	<---	BehaviouralDimension	1.000				
PEM7	<---	BehaviouralDimension	.861	.083	10.358	***	par_5
PEM8	<---	BehaviouralDimension	.713	.070	10.190	***	par_6
PEM9	<---	BehaviouralDimension	.958	.073	13.059	***	par_7
PEM14	<---	CognitiveDimension	.679	.083	8.136	***	par_8
PEM13	<---	CognitiveDimension	.985	.068	14.470	***	par_9
PEM12	<---	CognitiveDimension	.903	.064	14.115	***	par_10
PEM11	<---	CognitiveDimension	.799	.061	13.205	***	par_11
PSQ5	<---	ProjectSuccess	1.000				
PSQ4	<---	ProjectSuccess	.993	.057	17.398	***	par_12
PSQ3	<---	ProjectSuccess	.952	.059	16.005	***	par_13
PSQ2	<---	ProjectSuccess	.939	.095	9.902	***	par_14
PSQ6	<---	ProjectSuccess	.928	.054	17.144	***	par_16
PSQ7	<---	ProjectSuccess	.928	.054	17.055	***	par_17
PSQ8	<---	ProjectSuccess	.975	.068	14.439	***	par_18
PSQ9	<---	ProjectSuccess	.851	.073	11.580	***	par_19
PSQ10	<---	ProjectSuccess	.979	.057	17.329	***	par_20
PSQ11	<---	ProjectSuccess	.906	.061	14.884	***	par_21

			Estimate	S.E.	C.R.	P	Label
PSQ12	<---	ProjectSuccess	.929	.059	15.871	***	par_22
PEM10	<---	CognitiveDimension	1.000				
PSQ9	<---	PSQ1	.211	.040	5.248	***	par_35

Source: Author's own research

Table 60: Structural standardised regression weights

			Estimate
ProjectSuccess	<---	AffectiveDimension	.337
ProjectSuccess	<---	BehaviouralDimension	.787
ProjectSuccess	<---	CognitiveDimension	-.517
PSQ1	<---	ProjectSuccess	.570
PEM1	<---	AffectiveDimension	.886
PEM2	<---	AffectiveDimension	.879
PEM3	<---	AffectiveDimension	.814
PEM4	<---	AffectiveDimension	.865
PEM5	<---	AffectiveDimension	.717
PEM6	<---	BehaviouralDimension	.790
PEM7	<---	BehaviouralDimension	.651
PEM8	<---	BehaviouralDimension	.642
PEM9	<---	BehaviouralDimension	.787
PEM14	<---	CognitiveDimension	.521
PEM13	<---	CognitiveDimension	.828
PEM12	<---	CognitiveDimension	.814
PEM11	<---	CognitiveDimension	.775
PSQ5	<---	ProjectSuccess	.865
PSQ4	<---	ProjectSuccess	.854
PSQ3	<---	ProjectSuccess	.815
PSQ2	<---	ProjectSuccess	.588
PSQ6	<---	ProjectSuccess	.848
PSQ7	<---	ProjectSuccess	.845
PSQ8	<---	ProjectSuccess	.767
PSQ9	<---	ProjectSuccess	.641
PSQ10	<---	ProjectSuccess	.852
PSQ11	<---	ProjectSuccess	.782
PSQ12	<---	ProjectSuccess	.812
PEM10	<---	CognitiveDimension	.807
PSQ9	<---	PSQ1	.242

Source: Author's own research

Table 61: Structural model covariance

			Estimate	S.E.	C.R.	P	Label
AffectiveDimension	<-->	BehaviouralDimension	.515	.067	7.693	***	par_25
BehaviouralDimension	<-->	CognitiveDimension	.655	.078	8.355	***	par_26
AffectiveDimension	<-->	CognitiveDimension	.511	.066	7.760	***	par_27
p11	<-->	p12	.266	.044	6.032	***	par_28
p10	<-->	p12	.199	.038	5.286	***	par_29
p10	<-->	p11	.252	.041	6.128	***	par_30
p2	<-->	p1	1.273	.144	8.858	***	par_31
p6	<-->	p7	.197	.033	5.892	***	par_32
p8	<-->	p9	.232	.051	4.531	***	par_33
p2	<-->	p8	.203	.051	3.959	***	par_34

Source: Author's own research

Table 62: Structural model correlations

			Estimate
AffectiveDimension	<-->	BehaviouralDimension	.761
BehaviouralDimension	<-->	CognitiveDimension	.972
AffectiveDimension	<-->	CognitiveDimension	.748
p11	<-->	p12	.513
p10	<-->	p12	.460
p10	<-->	p11	.541
p2	<-->	p1	.729
p6	<-->	p7	.537
p8	<-->	p9	.334
p2	<-->	p8	.179

Source: Author's own research

Table 63: Structural model variances

	Estimate	S.E.	C.R.	P	Label
AffectiveDimension	.686	.082	8.387	***	par_36
BehaviouralDimension	.667	.095	7.056	***	par_37
CognitiveDimension	.680	.093	7.302	***	par_38
p13	.698	.092	7.629	***	par_39
p1	1.697	.162	10.479	***	par_40
a5	.415	.042	9.991	***	par_41
a4	.222	.026	8.501	***	par_42
a3	.251	.027	9.286	***	par_43
a2	.203	.025	8.175	***	par_44
a1	.170	.021	7.970	***	par_45
b4	.376	.041	9.082	***	par_46
b3	.484	.048	10.096	***	par_47
b2	.672	.067	10.061	***	par_48
b1	.402	.044	9.063	***	par_49
c4	.290	.031	9.438	***	par_50
c3	.283	.031	9.011	***	par_51
c2	.302	.034	8.796	***	par_52
c1	.843	.081	10.463	***	par_53
p2	1.795	.167	10.722	***	par_54
p3	.494	.052	9.526	***	par_55
p4	.396	.044	9.067	***	par_56
p5	.361	.041	8.873	***	par_57
p6	.364	.040	9.079	***	par_58
p7	.371	.041	9.108	***	par_59
p8	.718	.072	9.966	***	par_60
p9	.671	.067	10.001	***	par_61
p10	.389	.043	9.027	***	par_62
p11	.560	.058	9.676	***	par_63
p12	.480	.051	9.448	***	par_64
c5	.363	.040	9.091	***	par_65

Source: Author's own research

Table 64: Structural model square multiple correlations

	Estimate
ProjectSuccess	.352
PSQ1	.324
PEM10	.652

	Estimate
PSQ12	.660
PSQ11	.612
PSQ10	.726
PSQ9	.646
PSQ8	.588
PSQ7	.714
PSQ6	.718
PSQ5	.749
PSQ4	.729
PSQ3	.664
PSQ2	.346
PEM14	.271
PEM13	.686
PEM12	.662
PEM11	.600
PEM6	.624
PEM7	.424
PEM8	.412
PEM9	.620
PEM1	.785
PEM2	.772
PEM3	.663
PEM4	.748
PEM5	.514

Source: Author’s own research

Table 65: Structural model - Cronbach's alpha

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if Item Deleted
PEM1	13.36	10.198	.834	.712	.891
PEM2	13.38	9.953	.821	.711	.893
PEM3	13.44	10.591	.783	.624	.902
PEM4	13.59	9.986	.820	.680	.894
PEM5	14.16	10.674	.696	.502	.919

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if Item Deleted
PEM6	11.15	6.122	.628	.406	.767
PEM7	11.32	5.920	.630	.398	.768
PEM8	10.98	6.755	.599	.369	.782
PEM9	11.26	6.088	.677	.463	.744

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if Item Deleted
PEM10	15.21	9.559	.710	.537	.818
PEM11	15.04	10.462	.709	.529	.822
PEM12	15.06	10.001	.734	.580	.813
PEM13	15.07	9.518	.761	.599	.804
PEM14	15.46	10.507	.492	.247	.879

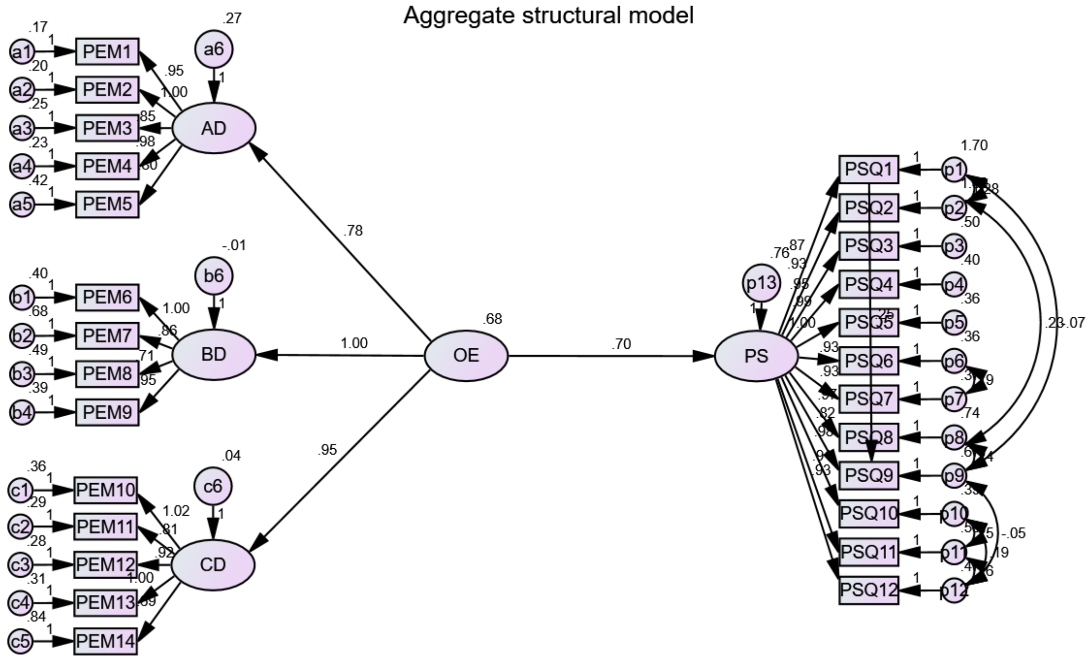
Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if Item Deleted
PSQ1	61.16	130.703	.629	.722	.950
PSQ2	61.29	128.767	.648	.733	.950
PSQ3	60.61	132.539	.788	.644	.944
PSQ4	60.71	132.320	.800	.690	.943
PSQ5	60.55	131.897	.823	.715	.943
PSQ6	60.42	133.258	.818	.798	.943
PSQ7	60.38	133.438	.809	.813	.943

PSQ8	61.14	131.229	.760	.658	.945
PSQ9	61.03	129.179	.794	.694	.943
PSQ10	60.50	131.582	.841	.817	.942
PSQ11	60.56	133.235	.769	.762	.944
PSQ12	60.28	133.120	.784	.776	.944

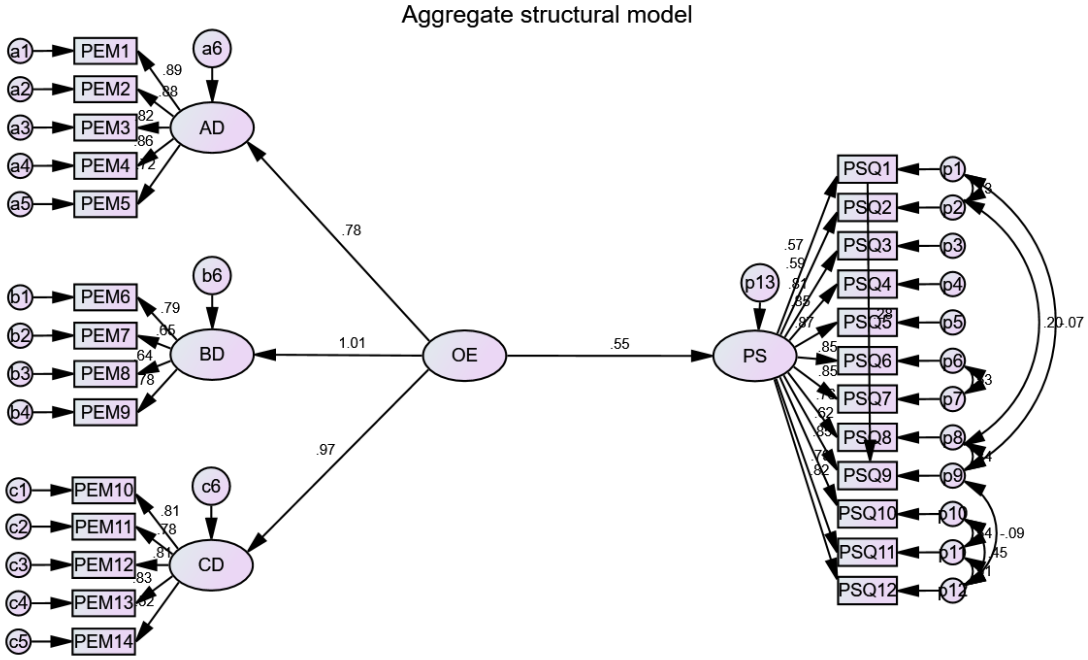
Source: Author's own research

Figure 21: Detailed aggregate structural model with unstandardised estimates



Source: Author's own research

Figure 22: Detailed aggregate structural model with standardised estimates



Source: Author's own research

Table 66: Structural unstandardised regression weights

			Estimate	S.E.	C.R.	P	Label
ProjectSuccess	<---	AffectiveDimension	.422	.134	3.137	.002	par_23
ProjectSuccess	<---	BehaviouralDimension	1.000				
ProjectSuccess	<---	CognitiveDimension	-.650	.143	-4.533	***	par_24
PSQ1	<---	ProjectSuccess	.870	.092	9.502	***	par_15
PEM1	<---	AffectiveDimension	.951	.050	18.970	***	par_1
PEM2	<---	AffectiveDimension	1.000				
PEM3	<---	AffectiveDimension	.848	.052	16.174	***	par_2
PEM4	<---	AffectiveDimension	.980	.054	18.097	***	par_3
PEM5	<---	AffectiveDimension	.800	.061	13.104	***	par_4
PEM6	<---	BehaviouralDimension	1.000				
PEM7	<---	BehaviouralDimension	.861	.083	10.358	***	par_5
PEM8	<---	BehaviouralDimension	.713	.070	10.190	***	par_6
PEM9	<---	BehaviouralDimension	.958	.073	13.059	***	par_7
PEM14	<---	CognitiveDimension	.679	.083	8.136	***	par_8
PEM13	<---	CognitiveDimension	.985	.068	14.470	***	par_9
PEM12	<---	CognitiveDimension	.903	.064	14.115	***	par_10
PEM11	<---	CognitiveDimension	.799	.061	13.205	***	par_11
PSQ5	<---	ProjectSuccess	1.000				
PSQ4	<---	ProjectSuccess	.993	.057	17.398	***	par_12
PSQ3	<---	ProjectSuccess	.952	.059	16.005	***	par_13
PSQ2	<---	ProjectSuccess	.939	.095	9.902	***	par_14
PSQ6	<---	ProjectSuccess	.928	.054	17.144	***	par_16
PSQ7	<---	ProjectSuccess	.928	.054	17.055	***	par_17
PSQ8	<---	ProjectSuccess	.975	.068	14.439	***	par_18
PSQ9	<---	ProjectSuccess	.851	.073	11.580	***	par_19
PSQ10	<---	ProjectSuccess	.979	.057	17.329	***	par_20
PSQ11	<---	ProjectSuccess	.906	.061	14.884	***	par_21
PSQ12	<---	ProjectSuccess	.929	.059	15.871	***	par_22
PEM10	<---	CognitiveDimension	1.000				

			Estimate	S.E.	C.R.	P	Label
PSQ9	<---	PSQ1	.211	.040	5.248	***	par_35

Source: Author's own research

Table 67: Structural standardised regression weights

			Estimate
ProjectSuccess	<---	OrganisationalEnergy	.550
AffectiveDimension	<---	OrganisationalEnergy	.775
BehaviouralDimension	<---	OrganisationalEnergy	1.007
CognitiveDimension	<---	OrganisationalEnergy	.966
PSQ1	<---	ProjectSuccess	.570
PEM5	<---	AffectiveDimension	.716
PEM4	<---	AffectiveDimension	.862
PEM3	<---	AffectiveDimension	.818
PEM2	<---	AffectiveDimension	.878
PEM1	<---	AffectiveDimension	.887
PEM9	<---	BehaviouralDimension	.781
PEM8	<---	BehaviouralDimension	.640
PEM7	<---	BehaviouralDimension	.649
PEM6	<---	BehaviouralDimension	.791
PEM14	<---	CognitiveDimension	.519
PEM13	<---	CognitiveDimension	.826
PEM12	<---	CognitiveDimension	.812
PEM11	<---	CognitiveDimension	.775
PSQ4	<---	ProjectSuccess	.854
PSQ5	<---	ProjectSuccess	.867
PSQ6	<---	ProjectSuccess	.848
PSQ7	<---	ProjectSuccess	.847
PSQ8	<---	ProjectSuccess	.762
PSQ2	<---	ProjectSuccess	.586
PSQ3	<---	ProjectSuccess	.813
PSQ12	<---	ProjectSuccess	.817
PSQ11	<---	ProjectSuccess	.785
PSQ10	<---	ProjectSuccess	.853
PSQ9	<---	ProjectSuccess	.620
PEM10	<---	CognitiveDimension	.809
PSQ9	<---	PSQ1	.284

Source: Author's own research

Table 68: Structural model covariance

			Estimate	S.E.	C.R.	P	Label
p2	<-->	p1	1.275	.143	8.888	***	par_19
p6	<-->	p7	.195	.033	5.857	***	par_20
p10	<-->	p11	.249	.041	6.078	***	par_21
p8	<-->	p9	.240	.054	4.472	***	par_22
p11	<-->	p12	.258	.044	5.903	***	par_23
p9	<-->	p12	-.053	.030	-1.770	.077	par_24
p10	<-->	p12	.193	.037	5.165	***	par_25
p9	<-->	p1	-.071	.068	-1.044	.297	par_26
p2	<-->	p8	.230	.057	4.062	***	par_33

Source: Author's own research

Table 69: Structural model correlations

			Estimate
p2	<-->	p1	.729
p6	<-->	p7	.534
p10	<-->	p11	.537
p8	<-->	p9	.342
p11	<-->	p12	.506
p9	<-->	p12	-.094
p10	<-->	p12	.453
p9	<-->	p1	-.067
p2	<-->	p8	.200

Source: Author's own research

Table 70: Structural model variances

	Estimate	S.E.	C.R.	P	Label
OrganisationalEnergy	.677	.097	6.978	***	par_36
p13	.756	.096	7.916	***	par_37
p1	1.698	.162	10.478	***	par_38
a6	.273	.039	7.079	***	par_39
b6	-.010	.028	-.348	.728	par_40
c6	.044	.025	1.739	.082	par_41
a5	.417	.042	9.989	***	par_42
a4	.227	.027	8.543	***	par_43
a3	.246	.027	9.224	***	par_44
a2	.203	.025	8.154	***	par_45
a1	.169	.021	7.912	***	par_46
c1	.361	.040	9.067	***	par_47
b4	.385	.042	9.103	***	par_48
b3	.486	.048	10.117	***	par_49
b2	.675	.067	10.079	***	par_50
b1	.400	.045	8.971	***	par_51
c5	.844	.081	10.465	***	par_52
c4	.306	.035	8.821	***	par_53
c3	.285	.032	9.020	***	par_54
c2	.289	.031	9.427	***	par_55
p2	1.801	.167	10.770	***	par_56
p3	.498	.052	9.552	***	par_57
p4	.397	.044	9.081	***	par_58
p5	.359	.041	8.866	***	par_59
p6	.363	.040	9.079	***	par_60
p7	.367	.040	9.091	***	par_61
p8	.735	.074	9.880	***	par_62
p9	.668	.068	9.863	***	par_63
p10	.388	.043	9.010	***	par_64
p11	.555	.057	9.654	***	par_65
p12	.470	.050	9.356	***	par_66

Source: Author's own research

Table 71: Aggregate structural model - Cronbach's alpha

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if Item Deleted
PEM1	47.23	84.908	.761	.729	.928
PEM2	47.25	84.419	.743	.722	.928
PEM3	47.31	86.087	.709	.653	.929
PEM4	47.45	84.403	.748	.695	.928
PEM5	48.03	87.184	.588	.520	.933
PEM6	47.10	82.784	.762	.612	.927
PEM7	47.27	84.867	.610	.421	.933
PEM8	46.93	87.244	.597	.414	.932
PEM9	47.20	84.230	.710	.620	.929
PEM10	47.10	83.534	.728	.642	.929
PEM11	46.93	86.304	.705	.581	.930
PEM12	46.94	84.465	.765	.625	.928
PEM13	46.96	83.496	.765	.658	.927
PEM14	47.35	87.516	.473	.275	.937

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if Item Deleted
PSQ1	61.16	130.703	.629	.722	.950
PSQ2	61.29	128.767	.648	.733	.950
PSQ3	60.61	132.539	.788	.644	.944
PSQ4	60.71	132.320	.800	.690	.943
PSQ5	60.55	131.897	.823	.715	.943
PSQ6	60.42	133.258	.818	.798	.943
PSQ7	60.38	133.438	.809	.813	.943
PSQ8	61.14	131.229	.760	.658	.945
PSQ9	61.03	129.179	.794	.694	.943
PSQ10	60.50	131.582	.841	.817	.942
PSQ11	60.56	133.235	.769	.762	.944
PSQ12	60.28	133.120	.784	.776	.944

Source: Author's own research