The Impact of Information Technology Sophistication on the Work Alienation of Knowledge Workers

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ABSTRACT

This research paper investigated the impact of information technology sophistication on the perceived work alienation of knowledge workers, specifically in the financial services sector.

The value of the knowledge worker, particularly in knowledge-intensive organisations, is considered to be the most valued asset of the contemporary organisation. Yet, as modern organisations are challenged by the worldwide economic deterioration, they reach out to sophisticated information technology solutions to provide a more conclusive customer value proposition and to secure a sustainable future. The possible alienating impact of the often radical technology solutions on the knowledge worker is, however, predominantly undefined.

The study was conducted through a web-based survey with a non-probability sample of 216 participants from eight major financial services institutions in Johannesburg, South Africa. The participants were questioned on their perceived work alienation within their working environment, job design and information technology sophistication contexts.

For the first time, it could be established that information technology sophistication does impact the perceived work alienation of knowledge workers. Information technology sophistication displayed a negative, yet statistically significant, relationship with perceived work alienation. Further, it was established that information technology sophistication also moderated the relationships between perceived work alienation and working environment, as well as the knowledge worker's job design. The findings are of great importance to organisations that need to implement sophisticated information technology solutions whilst protecting their knowledge worker workforce.

KEYWORDS

Financial Services Institution

Information Technology Sophistication

Knowledge Economy

Knowledge Worker

Work Alienation

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.

FM Coetzee   Date

ACKNOWLEDGEMENTS

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List of abbreviations and key words <<To be done>>

AI   Artificial intelligence

CCP   Cognitive Computing Participant

IT   Information Technology

NQ   Also referred to as NQF is the National Qualifications Framework

OCB   Organisational citizenship behaviour

SPSS   Statistical Package for Social Sciences

1. Chapter One: Introduction to the research problem

1.1. Research problem

The question of whether the increasing sophistication of information technology in the workplace is contributing to the perceived workplace alienation of knowledge workers has become a fundamental one that is confronting organisations globally. As orgnisations frantically try to reposition themselves in a rapidly changing global economy (World Economic Forum, 2016), they must grapple with the evaluation of all resources and their future relevance. Organisations globally are not only challenged by the worldwide economic deterioration and emergence of the knowledge economy, but also by the new digital revolution that is characterised by profound strategic challenges that threaten the very existence of many institutions (Hirt & Willmott, 2014). The digital revolution is manifesting through significant threats, characterised by the escalation of digital innovators and technology-based start-ups that manage to disintermediate traditional role players (Dietz, Härle & Khanna, 2016; Walker, 2014).

In a desperate effort to minimise their market losses and to provide a more definitive customer value proposition, organisations are attempting to retaliate through digital solutions that rely heavily on advanced, modern technologies such as big data, artificial intelligence, cognitive computing and automation (Noor, 2015). Drucker (1999) stated that the value of the knowledge worker, particularly in knowledge-intensive organisations, is the most valued asset of the 21st century organisation. Yet, the complex integration of knowledge workers with a wide array of technology solutions does present new dimensions of workplace complications and challenges (Wihlborg, Larsson & Hedstr, 2016). One particular threat is the possible work alienation of knowledge workers due to the impact of modern technologies in the place of work (Nair & Vohra, 2010).

This research paper investigates the impact of information technology and computing sophistication on the perceived work alienation of knowledge workers, specifically in the financial services sector.

1.2. Business need for the study

1.2.1. State and transition of the global economy

Across the globe leaders of state, economists and influential business leaders seemed to have lost their influence over the deteriorating world economy. It has been eight years since the implosion of a wide array of financial institutions and organisations

internationally (Ivashina & Scharfstein, 2010). The global economic prospects for 2016, and for the decade for that matter, are suppressed by inadequate and irregular growth (World Economic Forum, 2016). The globe is preparing for a future of

"exponentially disruptive change as assumptions about growth models have been overturned, the international balance of power continued to fray, and scientific and technological breakthroughs stood poised to transform economies and societies". (World Economic Forum, 2016, p. 1).

The modern economy is not only in a state of crisis; it is also in the process of transforming into a knowledge economy. A knowledge economy is one that is based on the creation, evaluation and trading of knowledge in order to create economic wealth (Asongu, 2014; Tchamyou, 2015). It is characterised by real-time information exchange and an ever-increasing pace of disruptive innovation, whilst any form of competitive advantage at any point in time suffers from a progressively contracted lifespan (Leon, 2011). The current state of the knowledge economy is more volatile than ever experienced before (Leon, 2011). In a knowledge economy, labour costs become increasingly trivial, whilst established economic notions such as scarcity of resources and economies of scale no longer apply. Knowledge workers and their rates of productivity stepped to the forefront to be recognised as the most valuable assets of the 21st century institution, in both business and non-business contexts (Hendarman & Tjakraatmadja, 2012).

1.2.2. The knowledge worker

The knowledge worker is considered the enabler through which the majority of organisational resources, including knowledge, are processed and transformed into a sustainable competitive advantage (Leon, 2011). As more 21st century organisations transition at an increasing pace to service-orientated business models, the composition, application and total benefit realisation of the knowledge worker workforce plays an increasingly fundamental role in the repositioning of these organisations.

Knowledge workers do, however, also introduce a variety of complexities into the working environment, as they typically oppose centralised, hierarchical working environments (Murray & Greenes, 2007), they prefer to function autonomously (Nair & Vohra, 2010) and generally seem to be highly mobile, regularly seeking new challenges (Davenport, Thomas & Cantrell, 2002). The organisation that is already under pressure, is therefore also continuously challenged to retain the such workers and to keep them engaged and dedicated (Yigitcanlar, Baum & Horton, 2007). It is therefore essential for the development of any sustainable organisation to secure knowledge workers, and to ensure their continued commitment to the organisation, along with their high productivity

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rates (Millar & Choi, 2010; Nair & Vohra, 2010). Thus, a thorough understanding of the possible work alienating precursors that may contribute to the alienation of the knowledge worker in the modern place of work and the impact of said alienation on the knowledge worker and the organisation is essential. Work alienation manifests as a state of detachment of the knowledge worker from his / her place of work, business processes and also work deliverables (Shantz, Alfes, Bailey & Soane, 2015), effectively disabling these "key strategic and competitive" (Nair & Vohra, 2010, p. 600), but also well remunerated (Çetin, Özdemirci & Kartaltepe, 2009) resources of the modern knowledge organisation.

As knowledge organisations strive to provide for the knowledge workers' growing technology needs (Johns & Gratton, 2013) whilst also supporting their own increasingly sophisticated requirements, these organisations turn to information technology (IT) to provide wide-spread and comprehensive business solutions (Luftman, Lyytinen & ben Zvi, 2015). Alarming though, it appears that due to the proliferation of technology solutions and computing participants in business the knowledge worker's unique contribution in the modern working environment is increasingly becoming more challenged (Noor, 2015). Technology solutions may range from the automation of rudimentary, repetitive activities to the complete transition of complex knowledge work into technology solutions. The automation of knowledge work is made possible through a range of technology solutions that incorporates cognitive computing participants that boast the capacity to learn, reason, perceive and process natural language (Noor, 2015).

1.2.3. Technological advances

Contemporary organisations have no option but to critically review their business strategies, operational efficiencies and ultimately their sustainable competitiveness. They must identify technology solutions in order to reverse their negative performance, or even to secure anticipated strategic strong holdings. Modern technological advances, for instance cognitive computing, offer an ever-expanding array of features like rule-based decision making, planning, scheduling and optimising capabilities, speech recognition, computer vision, natural language processing and machine learning (Fenn, 2015; Noor, 2015; Schatsky, Muraskin & Gurumurthy, 2014). These features hold the promise to deliver dramatic improvements in any organisation and its workforce.

IT investments are generally made with the expectation that the organisation making the investment will develop in its technology sophistication, and become more effective and efficient (Alserhan & Brannick, 2002). An organisation that does manage to develop higher levels of IT sophistication will have the opportunity to benefit in a number of areas. For instance, the alignment of business and IT strategies (Hussin, King, & Cragg, 2002),

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and the improvement of individual and organisational performance (Mohd-Daud & Mohamed, 2008). Further, improved business performance, productivity and effectiveness can also be attained (Ibrahim & Lam, 2012; de Búrca, Fynes & Brannick, 2006).

Organisations and business at large have the option to implement varied degrees and combinations of modern and sophisticated IT solutions to augment and improve conditions for their workers, or to replace the workers. However, the expected impact of IT interventions is of such a nature that it is estimated that more than 100 million higher skilled jobs may be impacted over the next decade (Justice, 2015), therefore directly competing with the capabilities offered by the knowledge worker. It is even speculated that future rewards will most likely be seized by those heading the income distribution, and in particular those who would have developed to be the "most adept at working with smart machines" (Lanchester, 2015, p. 1).

1.2.4. Financial service institutions under attack

It is of vital importance that contemporary organisations globally, including financial service institutions, perform and honest and discerning evaluation of their business strategies in the light of the evolving global knowledge economy, the role of sophisticated and disruptive IT solutions, as well as the short to medium term role of knowledge workers. "Banking is at an inflection point," said Anju Patwardhan, Group Chief Innovation Officer of Standard Chartered Bank, Singapore, during the World Economic Forum's Digital Disruption of Finance session, held on 10 September 2015 (World Economic Forum, 2015).

Set against the backdrop of worldwide economic transformation and deterioration, financial institutions and banks are experiencing tremendous levels of disruption that are stimulated by the increasing momentum of technology innovation, growing customer demands, regulatory contradictions and pressure, and a host of other disruptors (Van Liedekerke & Dubbink, 2009). Historical and incumbent financial institutions, in particular, are at risk of being left behind (Hirt & Willmott, 2014) as they are losing captured customers and even the unbanked to new technology start-up companies that are able to provide highly effective, focused financial service solutions. Financial service institutions are confronted with the ultimatum to transition to modern technology service provider models or face possible extinction (Hirt & Willmott, 2014).

1.3. Theoretical need for the study

Contemporary organisations have no option but to critically evaluate their business strategies, operational efficiencies and ultimately their sustainable competitiveness, as they are reaching out to sophisticated IT solutions in order to reverse their negative performance, or even to secure anticipated strategic strong holdings. Transformation does, however, also introduce risks that may be detrimental to growth and further development, including the alienation of knowledge workers. Knowledge workers are still expected to play a prominent role in these contemporary knowledge-intensive organisations in the foreseeable future. It is therefore imperative to understand what role the increasing contribution from IT sophistication will play in these organisations, and whether it will contribute to the work alienation of the knowledge worker.

Unfortunately, contemporary management studies only seem to offer limited research and insight into work alienation (Nair & Vohra, 2012; Shantz et al., 2015). It also seems that the available academic material predominantly provides a generic approach to workers, incorporating manual and industrial workers, as well as knowledge workers into a singular construct despite their vastly different and distinguishing attributes (Chiaburu, Thundiyil & Wang, 2014). One exception is the work from Nair and Vohra (2010) where factors predicting work alienation of knowledge workers was explored. Even though the study analysed non-factory workers in a modern IT environment, it still failed to successfully reflect a more generalised modern place of work of the knowledge worker, which is expected to be characterised by technological advances, various degrees of IT sophistication and a more balanced knowledge worker profile.

Gross generalisations were also made by past researchers regarding the nature of technology, and specifically information technology, in a modern working environment. Researchers are tempted to blindly accept the findings of Blauner (1964), as cited in Nair and Vohra (2012), who discovered that blue-collar workers experienced different degrees of work alienation, subject to the organisational structure and the nature of the manual work that they performed. As an example, technology is therefore still broadly categorised as a work alienation predictor that contributes to the absence of meaningful work, as well as the limitation of worker autonomy (Nair & Vohra, 2012).

It was for this reason that Chiaburu et al. (2014) proposed that future research studies on work alienation should also focus on structural conditions, like technology. The evolving nature of technology is characterised by highly advanced capabilities such as artificial intelligence, cognitive computing and the Internet of Things, which may materialise as a number of areas of impact on the knowledge worker. For one, the fact that technology features as a pervasive contributor to the worker's working environment

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(Johns & Gratton, 2013). Further, the influence transcends into a wide variety of the worker's job design and performance imperatives. Additional research is therefore warranted into the developing role and impact of IT sophistication on the structural aspects of the knowledge worker's working environment, job design and characteristics as a precursor of work alienation.

Nair and Vohra (2010) also proposed that whilst future studies should focus on "non-factory workers" (Nair & Vohra, 2010, p. 607), the studies should also take into account a more generalised application, incorporating modern industries and also a more balanced gender, age and appointment profile.

This research study will therefore focus on the possible impact that IT sophistication may have on the perceived work alienation experienced by knowledge workers in financial services institutions. The study will focus on structural and physical conditions for worker alienation; conditions that can be controlled by the organisation and that are essential for planning the organisation's human resource strategy (Wöcke, Bendixen & Rijamampianina, 2007). Specific attention will therefore be paid to the working environment and job design precursors for work alienation, as proposed by Chiaburu et al. (2014). The study will not analyse the leader dimensions, role stressors or individual work alienation predictors that were nominated by Chiaburu et al. (2014) as work alienation precursors, due to their lack of structural characteristics.

The study will also contribute to the wider application of the research topic, as proposed by Nair and Vohra (2010), by incorporating knowledge workers from financial service institutions; institutions that were characterised by radical technological developments at the time of the study.

1.4. Outline of the research study report

The research report is presented as follows:

1. Chapter 1: Introduction to the research problem
2. Chapter 2: A literature review that details a broad view of the different academic constructs of interest for this research study. A review of the relevant and significant literature available on the research topic is provided.
3. Chapter 3: Details the research questions derived from the existing theories and previous empirical studies.
4. Chapter 4: The research methodology is detailed, as well as a clarification of how the data collection, analysis and interpretation was implemented in order to test the research questions presented in the study.
5. Chapter 5: The results for the statistical analyses of the data are presented.
6. Chapter 6: The overall findings for the research questions are discussed.
7. Chapter 7: Conclusion
8. Appendices

2. Chapter Two: Theory and literature review

Neo-classical economics has for the last two hundred years only acknowledged labour and capital as the primary wealth-creating factors (Hendarman & Tjakraatmadja, 2012). However, the modern knowledge economy that is dominating the 21st century is characterised by progressive and highly advanced technological developments that are transforming information and knowledge into wealth creation, rather than the traditional physical elements. Technology, knowledge and disruptive innovation are transpiring as the new key factors of production (Hendarman & Tjakraatmadja, 2012).

The knowledge worker, who is considered a critical resource in the knowledge-intensive organisation in this modern, volatile economy has progressively been confronted by the convergence of a wide variety of technological advances (Noor, 2015). Modern corporations employ management practices such as adaptability, faithfulness and active involvement. Implementing these through enablers such as improved educational levels, labour laws and technology has served to promote positive employee attitudes and results. However, it is also suggested that the same modern workplace practices may lead to negative employee attitudes, like alienation (Shantz et al., 2015). A variety of individual and structural factors in the working environment may contribute as precursors to the work alienation of the worker. Technology has been identified as one of the possible precursors to knowledge worker alienation in the workplace (Nair & Vohra, 2012).

Technology, and more specifically IT sophistication, may range from simple rules-based automation to some of the most technologically advanced instances that are commercially available, where cognitive computing participants are employed in the modern, semi-automated working environments (Fenn, 2015). The theory studied in this chapter focuses on three distinct topics, namely the knowledge worker positioned in the modern knowledge-intensive organisation, the precursors to the work alienation of the knowledge worker, and the role of IT sophistication in the knowledge worker's place of work. Figure 1 depicts the theoretical constructs studied in this chapter.

Figure 1:   Schematic illustrating the chapter flow
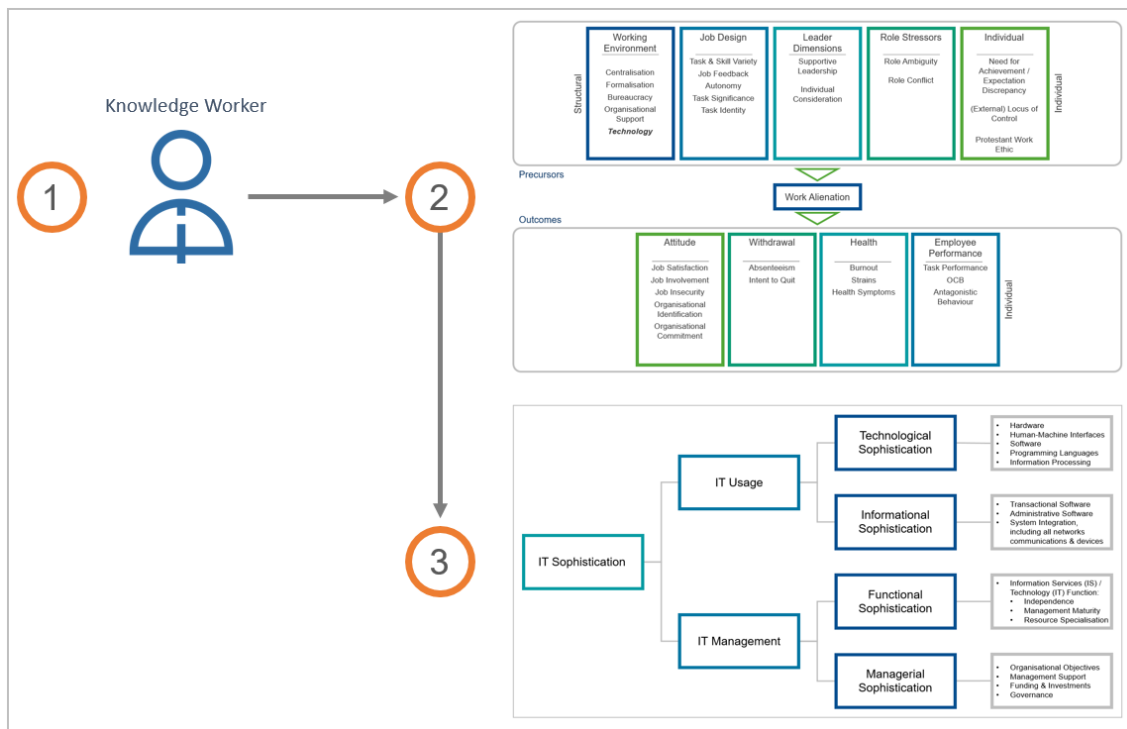
2.1. The knowledge worker

The uncertain and ever-evolving modern knowledge economy revolves around knowledge and the knowledge worker. Knowledge is commonly positioned as the "most critical resource in any developing country" (Millar & Choi, 2010, p. 760). The knowledge worker is considered the enabler through which the majority of organisational resources, including knowledge, are processed and transformed into a sustainable competitive advantage (Leon, 2011).

2.1.1. Who is the knowledge worker?

Peter Drucker (2011) differentiates the knowledge worker from the manual worker primarily by the cognitive skills used in the knowledge worker's activities, compared to a manual worker who will mainly rely on motor skills. Brinkley (2006) extended the concept of the knowledge worker to include the following worker categories, namely all those who:

1.   Are appointed in the primary three typical occupational categories, like managers, professionals and associate professionals;

2.   Have high skill levels, displayed through degree or degree equivalent qualifications, like NQ level 4. Dewhurst, Hancock and Ellsworth (2013) supported this skill level requirement.

3. Regularly perform activities that require complex communication skills and expert thinking, predominantly assisted by computer technologies. Sutherland and Jordaan (2004) also emphasised the knowledge worker's ability to apply specialised knowledge.

2.1.2. Role and positioning of the knowledge worker

It is expected that organisations will turn to knowledge workers to align their strategies for development, modernisation and future growth as they turn away from value appropriation and towards the creation of value (Flood, Turner, Ramamoorthy & Pearson, 2001). Securing knowledge workers and ensuring their continued commitment as well as high productivity rates (Millar & Choi, 2010) is therefore essential for the sustainable development of organisations. This is particularly true for knowledge-intensive firms that position implicit knowledge present in knowledge workers (Nair & Vohra, 2010) as a primary asset and are thus dependent on their human capital (Russ, 2016).

Knowledge workers are typically characterised by the fact that they add value to all other resources in the organisation through their knowledge and skills (Leon, 2011). Scholars suggest that the knowledge worker can be considered as the accelerator of progress and development in the modern knowledge economy (Davenport et al., 2002; Yigitcanlar, Baum and Horton, 2007) and is thus pivotal to "strategic and competitive resources" (Nair & Vohra, 2010, p. 600). The value of the knowledge worker and the benefits of their heightened productivity rates were identified as some of the most valuable assets of the 21st century organisation (Drucker, 1999). Based on the services and knowledge-intensive nature of financial institutions, knowledge workers are therefore considered to play a central role in these organisations (Reddy & Govender, 2014).

Murray and Greenes (2007), however, counter-argue the contribution of the knowledge worker in the modern knowledge-intensive organisation. They state that despite the value that knowledge workers offer, they also introduce several challenges into the working environment. Knowledge workers are typically considered to oppose centralised, hierarchical working environments that employ command and control approach. They prefer to function autonomously and generally seem to be highly mobile (Nair & Vohra, 2010). Davenport et al. (2002) and Yigitcanlar, Baum and Horton (2007) argue that since the knowledge worker is regularly seeking new challenges, as well as improved working environments and salaries, the organisation is continuously challenged to retain these workers and to keep them engaged and dedicated. It is for this reason that Drucker (1999) noted that the greatest management challenge of the 21st century will be to ensure the continued productivity of the knowledge worker. He

argued that changes in the attitude of the individual knowledge worker and the entire organisation will be required to ensure sustainable productivity in such workers (Drucker, 1999).

2.1.3. Alternatives to the knowledge worker

Modern organisations are pressured to optimise their operations and ultimately their profitability. Knowledge workers, equipped with the tacit organisational knowledge, played an essential role in achieving these organisational goals. Yet, their productivity and commitment challenges compared to the opportunities that modern automation solutions offer, make the uncertainties of redesigning the modern knowledge-intensive organisation increasingly viable (Noor, 2015).

The knowledge workers' unique contribution in the modern working environment is becoming increasingly more challenged through the automation of job activities ranging from rudimentary, repetitive activities to complex knowledge work (Noor, 2015). The automation of knowledge work is made possible through a range of technology solutions, which include cognitive computing participants. Instead of just executing a rudimentary set of rule-based commands, a cognitive computing participant has the ability to receive an unstructured command spoken in a natural language, perform the necessary research to broaden its understanding of the topic, and provide a quality conclusion based on hypotheses analysis (Fenn, 2015). Thus, it has become a viable option to automate a wide spectrum of knowledge workers' job activities. However, the road to establishing these highly automated organisations is still uncertain and potentially highly disruptive; a process which may dramatically increase the alienation of the knowledge workers (Autor, 2015; Szalma & Taylor, 2011; Yildiz, 2012).

Scholars do concur on the concern that any form of alienation of the knowledge worker can have a fundamentally debilitating impact on the organisation (Nair & Vohra, 2010). Furthermore, if the knowledge worker does leave the organisation, a primary asset element will be lost, and the organisation may start to suffer from pockets of knowledge vacuums.

2.2. Alienation of the knowledge worker

2.2.1. Background and definition

In Roman law, alienation was associated with the voluntary handover of property from one owner to another (Kalekin-Fishman & Langman, 2015). The roots of alienation in academic literature, however, date back as early as the 19th century when it was

documented in a religious context stating that a person enters a state of alienation when they are separated from an existence on earth to a 'higher state' (Chiaburu et al., 2014). Similarly, when a person became estranged from God and the religious community (Healy, 2014) they were also regarded as estranged. Hegel (1977) is cited to have made prominent contributions to the concept of alienation building onto the foundations steeped in religion (Chiaburu et al., 2014).

Karl Marx, in his influential work *Economic and Philosophic Manuscripts* (1844) rejected the earlier 19th century religious and spiritual associations, and established the conceptualisation of alienation in social, organisational and work contexts. Marx (1844), as cited in Nair and Vohra (2012), conceptualised alienation as the separation of the worker from ownership, where alienation can manifest either as a separation from the work product, the production process or even from society. He developed alienation from an ethics base into a normative instrument and assessed society through this lens (Chiaburu et al., 2014). This stance was echoed by Regis (1895) who argued that alienation was based on a state of mental health.

These earlier influential works were later followed by seminal contributions from Seeman (1959) who approached alienation from a psychological viewpoint; and Fromm (2012) who addressed alienation through a social lens. Their works were later supplemented by a variety of contributions that emphasised different disciplinary lenses, for example organisational science, social psychology and sociology (Chiaburu et al., 2014).

Seeman (1959) is cited to have positioned alienation as a multidimensional construct that is represented by "powerlessness, meaninglessness, normlessness, social isolation and self-estrangement" (Nair & Vohra, 2012, p. 27). Fromm (2012) was in agreement that alienation extended its work context to an all-encompassing state where man would be consumed in all the aspects of life.

Despite the fact that these views received widespread international support, opposing views emerged that promotes alienation as a unidimensional core that leads to self-estrangement (Shantz et al., 2015). Nair and Vohra (2012) supported this view by stating that the "common theme appearing in most conceptualizations of alienation appears to be the notion of estrangement or separation" (Nair and Vohra, 2012, p. 602). The majority of academic literature seemed to agree that work alienation would materialise as a "dissociate state of the individual" (Shantz et al., 2015, p. 384); a degree of disconnect from the working environment, the work processes, activities, and even the product of work, as well as the self (Nair & Vohra, 2009). For the purposes of this study, this broad overview of alienation as a state of self-estrangement was supported.

2.2.2. Precursors of alienation in the workplace

Nair and Vohra (2010) in their study into the precursors of work alienation of knowledge workers in the Indian IT industry, developed the following alienation precursor model for knowledge workers, as depicted in Figure 2.

Figure 2:   Precursors of work alienation of knowledge workers
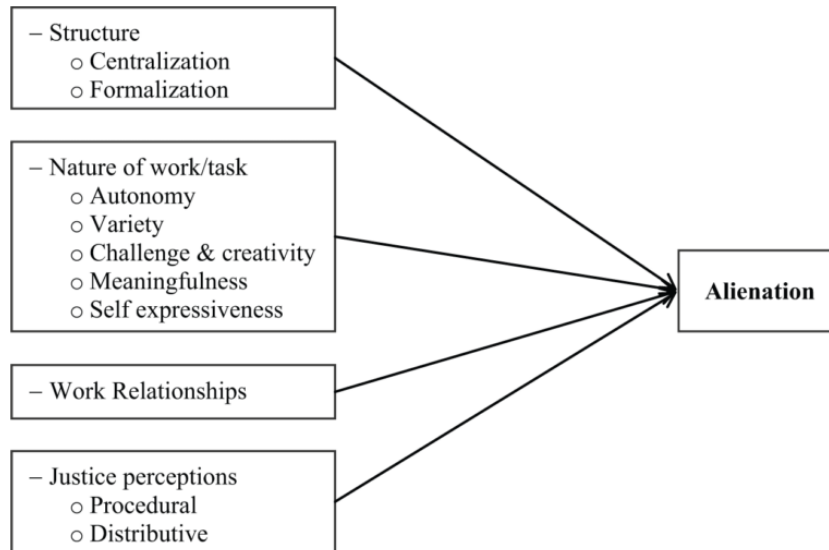
Source: Nair and Vohra (2010).

The alienation precursor model identified structural, work characteristic, work relationship and justice perceptions as the core theoretical constructs for the model (Nair & Vohra, 2010).   Building on this model, as well as a wide variety of influential management theories, Chiaburu et al. (2014) developed a more comprehensive model to describe the precursors for work alienation.   The model depicted in Figure 3 consists of the individual characteristics, role stressors, leader dimensions, job design and work context precursors (Chiaburu et al., 2014).

Figure 3: **Theoretical model of work alienation predictors and outcomes**
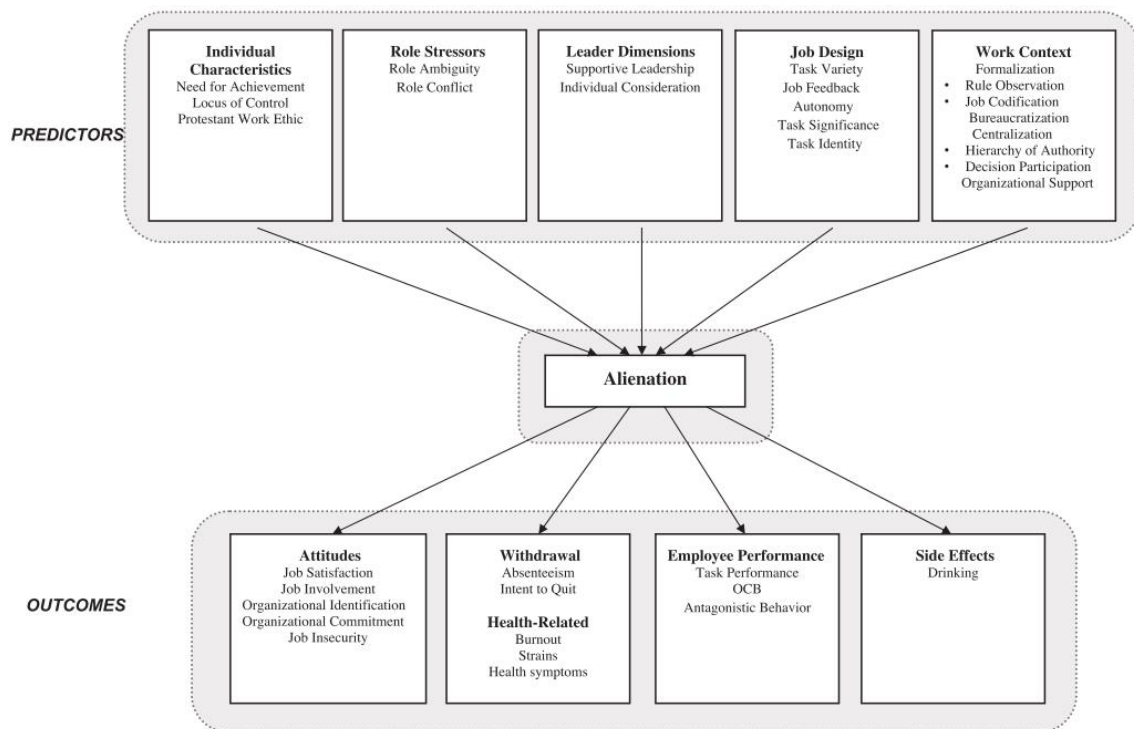
Source: Chiaburu et al. (2014).

The work alienation predictors from the abovementioned models were combined for the purpose of this research study to form a work alienation precursor model that consists of five core theoretical constructs. The constructs are **Working Environment** (structure or work context), **Job Design** (nature of the task), **Leader Dimensions**, **Organisational Role Stressors** and **Individual Characteristics**. The Working Environment construct incorporates the work structure (Nair & Vohra, 2010) and technology (Nair & Vohra, 2012) precursor elements, whilst the Job Design construct reaffirms the inclusion of the autonomy, task variety, task identity and social support elements, as detailed by Shantz et al. (2015). These work alienation precursors are addressed in more detail in the following sections.

2.2.3. Working environment

Working environments introduce structural limitations in the organisation that may contribute to the alienation experienced by the worker (Podsakoff, Whiting, Podsakoff & Blume, 2009). These include the issues of centralisation, formalisation, bureaucratisation, organisational support (Chiaburu et al., 2014), as well as technology (Nair & Vohra, 2010), that will now be discussed individually. A working environment may introduce limitations through a number of structural dimensions, the first being centralisation. **Centralisation** is characterised by the implementation of a hierarchy of authority that results in a specific group that takes responsibility for planning and decision

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making, which excludes or limits the knowledge worker from participating in decisions, ownership in initiatives and ultimately exerting self-control. Each of these areas of impact contributes to alienation experienced by the worker (Chiaburu et al., 2014).

Workplace **formalisation** is another structural dimension and involves the implementation of policies, procedures and rules, and incorporates the supervision in rule adherence and the specification of jobs or job codification (Chiaburu et al., 2014). Professionals and knowledge workers are believed to experience higher levels of alienation, the higher the degree of centralisation and formalisation in the working environment (Aiken & Hage, 1966; Nair & Vohra, 2012).

The role of formalisation is, however, still being contested. Podsakoff et al. (2009) argue that since the worker's capacity to exercise control may be restricted due to the intimidating natures of rule observation and job codification, employees should actually benefit from reduced role ambiguity through formalisation. Chiaburu et al. (2014) argued that knowledge workers may experience job formalisation rather as a limitation.

Workplace **bureaucratisation** is the phenomenon originally detailed by Kohn (1971), as cited by Nair and Vohra (2010), where management is realised through the implementation of additional procedures and controls. Workplace bureaucracy may contribute to the constraints when more procedures and governance controls are added over time in an effort to exercise more rigorous management control (Atzeni, 2016). More control applied on the knowledge worker is, however, expected to have a negative impact on the worker who may experience a limitation in autonomy (Chiaburu et al., 2014).

Organisational support materialises as the worker's perception of the organisation's dedication to the worker, or the degree to which the worker's involvement is valued. An increase in organisational support is expected to positively contribute to the worker's emotional, intellectual and even physical resources, which are expected to result in a decrease in alienation (Eisenberger, Fasolo & Davis-LaMastro, 1990; Chen, Shang, Hou & Lee, 2012).

Blauner (1964), cited in Nair and Vohra (2012), studied workers in an industrial setting and managed to show varied worker alienation, depending on the organisational structure and the types of technology that the workers were exposed to. He claimed that **technology** leads to reduced levels of autonomy, as well as having a direct impact on all aspects of the tasks that must be performed. Contemporary working environments typically employ a variety of increasingly sophisticated IT components. Workers' places of work are often highly integrated with technology and computing components, and they interact with computerised systems that process information based on computerised

work processes. The sum of the IT sophistication of the organisation and the IT impact on the knowledge worker may result in deskilling and high levels of specialisation, which may lead to negative alienating outcomes (O'Donohue & Nelson, 2012).

The working environment precursors of work alienation play a central role in the influence of the contemporary and future working environment of the knowledge worker. Forecasting studies predict that future organisations are expected to become increasingly centralised, with amplified degrees of formalisation (Davenport, 2011; Yildiz, 2012).

2.2.4. Job design

Job autonomy, job feedback and task identify, significance and variety are the attributes that contribute to a well-designed job's positive psychological influence. The positive experience may lead to lower perceived levels of work alienation as experienced by the knowledge worker (Banai & Reisel, 2007).

Jindal, Garg & Rastogi (2014), citing Hackman & Oldham (1975), and Shantz et al. (2015) stated that a knowledge worker may experience different degrees of job gratification, depending on the perceived **job autonomy**, which addresses the freedom and discretion to perform a task, and the **job feedback**, when communicated as clear and opportune observations and responses to the task performed. It is also of importance to the knowledge worker to receive clearly defined and distinguishable work components (**task identity**), tasks that are significant to the organisation and other role players (**task significance** or **meaningfulness**), whilst being provided with the opportunity to employ a range of competencies to successfully complete a task (**task and skill variety**) (Chiaburu et al., 2014; Shantz et al., 2015).

Contemporary places of work and job designs incorporate varied degrees of technology in order to improve the levels of managerial decision-making and overall efficiencies, but at the same time also contribute to the potential alienation of the worker (O'Donohue & Nelson, 2012). Knowledge workers tend to be increasingly isolated and confined to a computer workstation, with decreasing social interaction with colleagues. This phenomenon is particularly prominent in large corporate organisations, like financial services institutions, where the knowledge worker is further subjected to regular change through strategic interventions such as mergers and acquisitions, restructuring of business units and introduction of sophisticated computer systems. IIT continues to be further developed and extended to provide stealth-like supervisory services leading to the frequent defragmentation and reorganisation of jobs to accommodate participation of computing participants (O'Donohue & Nelson, 2012).

The roles and competencies of knowledge workers and therefore the design and characteristics of their jobs are required to be modified in order to accommodate the increasing role of IT sophistication in rule observation and workplace bureaucracy, with computing participants acting as co-bureaucrats (Wihlborg et al., 2016). Computerised work schedules and keystroke tracking, process monitoring and even CCTV surveillance all offer subtler forms of limitation compared to the assembly lines studied by Marx (1844), as cited in O'Donohue and Nelson (2012). Progressively, the worker's ability to function autonomously and to exercise decision-making and discretion is steadily impaired (Deery and Kinnie, 2002; Holman, 2003). Knowledge workers who are working in these contemporary environments that offer very little task and skill variety also tend to experience a lack of task significance and meaningfulness (Ashman & Gibson, 2010).

2.2.5. Leader dimensions

Leadership is posited as the influence process employed so that subordinates will cooperatively fulfil a task (Banai & Reisel, 2007). Leadership displays a negative relationship with perceived work alienation when employee involvement is promoted, conflict is resolved and transparency is increased, assisting employees with essential emotional resources (Chiaburu et al., 2014).

The display of leadership is predominantly experienced through **supportive leadership**, aimed at goal achievement by guiding subordinates to perform targeted actions (Fiedler, 1996; House & Mitchell, 1974). Leadership may also manifest through **leader conduct** or individual considerations towards subordinates, when respect and concern for subordinates is displayed. This may assist subordinates with contributory and emotive resources, leading to decreased role ambiguity (Judge, Piccolo & Ilies, 2004).

DiPietro and Pizam (2008) argued that workplace alienation may primarily be the result of leadership styles and management practices, rather than the technology implemented or even the job design in the worker's place of work.

2.2.6. Organisational role stressors

Chiaburu et al. (2014) argued that organisational role stressors display a positive relationship with knowledge workers' work alienation when the workers experience psychological anxiety and distractions. This may be the result of **role ambiguity** when the worker is uncertain of exactly what is required to fulfil the role, including the required procedures and the role performance outcomes (Nair & Vohra, 2012). Work alienation may also be caused by **role conflict**, when the worker is confronted with incompatible role requirements (Riolli & Savicki, 2014).

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2.2.7. Individual characteristics

The knowledge workers themselves may also contribute to their perceived work alienation, depending on their different individual characteristics (O'Donohue & Nelson, 2014). A knowledge worker may have a **need for achievement** that motivates the worker to exercise effort in order to achieve targeted goals (Chiaburu et al., 2014). A worker's **locus of control**, the degree to which the worker believes s/he can influence actions that will impact them, is also widely accepted as a contributor to perceived work alienation (Nair & Vohra, 2012). Lastly, a worker's belief that work is fulfilling, necessary and desirable, the **protestant work ethic**, is also recognised to impact the worker's perceived work alienation (Banai & Reisel, 2007).

2.2.8. Outcomes of work alienation

Contemporary views that alienation manifests as a unidimensional core support the argument that work alienation would materialise as a "dissociate state of the individual" (Shantz et al., 2015, p. 384) that results in self-estrangement. Nair and Vohra (2009) support the argument that the alienated worker will experience a degree of disconnect from the working environment, the work processes, activities and even the product of work, as well as the self.

Perceived work alienation was found to negatively predict significant **worker attitudes** towards the organisation, specifically the organisational identification and general commitment towards the organisation (Chiaburu et al., 2014; Shantz et al., 2015). Work alienation also negatively predicts worker attitudes towards job satisfaction, job involvement and job security (Chiaburu et al., 2014; Riolli & Savicki, 2014).

Poor **employee performance** is another area that is attributed to work alienation. Poor performance may be displayed as general antagonistic behaviour by the worker, poor task performance based on the worker's job description, or even organisational citizenship behaviour (OCB), which is the "discretionary performance not recognized by the formal reward system but necessary for organization functioning" (Chiaburu et al., 2014, p. 28) (Banai, Reisel & Probst, 2004).

Additionally, work alienation is known to result in behavioural **withdrawal**, which may result in absenteeism (Podsakoff et al., 2009). Workers may experience reduced reasons to stay on at the organisation, leading to an intent to quit the job and / or organisation. Another result of the negative alienation impact is burnout, which is a condition where the emotional state of the person is dominated by fatigue and the person's overall job performance gradually deteriorates to a point where the person cannot function productively (Jindal et al., 2014). Alienated workers may believe that

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they lack the necessary resources to perform their required job activities and may experience job-related strain as a result. Workers may also display a variety of health symptoms, which may be a culmination of the impact of burnout and the abovementioned stressors (Chiaburu et al., 2014).

"The most important contribution management needs to make in the 21st century is … to increase the productivity of knowledge work and knowledge workers." (Drucker, 1999, p. 79)

Drucker (1999) stated that knowledge workers' productivity is considered the primary survival requirement in developed countries. Any form of alienation of the knowledge worker can have a fundamentally debilitating impact on the organisation (Nair & Vohra, 2010). Furthermore, if the knowledge worker does leave the organisation, a primary asset element is lost, and the organisation may start to suffer from pockets of knowledge vacuums. In an effort to achieve their strategic goals, organisations are critically challenged to retain their valuable knowledge workers whilst progressively developing the utilisation and dependence on IT systems (Moore, 2000).

2.3. Information Technology

Contemporary researchers seemed to be tempted to simply accept the findings of Blauner (1964), as cited in Nair and Vohra (2012), who discovered that blue-collar workers experienced different degrees of work alienation, subject to the organisational structure and the nature of the manual work that they performed in industrial settings. Therefore, technology is often still broadly categorised as a work alienation predictor that contributes to the absence of meaningful work, as well as the limitation of worker autonomy (Nair & Vohra, 2012). The nature of technology, and specifically information technology, in the modern knowledge economy working environment is vastly different from the industrial settings. Longley and Shain (1985) provided one of the earlier definitions of information technology, considered to be the comprehensive collective of the "acquisition, processing, storage and dissemination of vocal, pictorial, textual and numeric information by a microelectronics-based combination of computing and telecommunication" (Longley and Shain, 1985, p. 164).

Modern IT concepts extend the definition further with a proliferation of new developments that range from artificial intelligence, big data analysis and the Internet of Things (Noor, 2015), to cognitive computing (Pupo, 2014). IT is also not only limited to an organisational or business context. Consumers voluntarily embrace new technology and IT developments (Ratchford & Barnhart, 2012), responding to its pervasiveness as it

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encapsulates large aspects of contemporary personal and work lifestyles through web-based collaboration and social networks (Cheung & Vogel, 2013) and modernised education systems (Padilla-MeléNdez, Del Aguila-Obra & Garrido-Moreno, 2013). Students are generally perceived to be digitally native (Padilla-MeléNdez et al., 2013).

2.3.1. Information technology sophistication

Extensive research to investigate the correlation between IT sophistication and various aspects of organisational performance have been performed over the years, dating back to the 1970's. Nolan (1973) was one of the first researchers to characterise technology sophistication as a progressive number of stages of maturity through which the IT landscape would progress until sophistication is eventually achieved. The end-state would be characterised by information resources that are completely established and where all computer-based systems are completely integrated. Khandwalla (1976) further developed the concept of IT sophistication by stating that a technologically sophisticated firm would be one that was based on an extensive basis of research and development, where the operational technologies would be intricate, and the business processes implemented and the products produced would be very sophisticated.

Raymond and Paré (1992) took a different approach to defining IT sophistication by creating a multidimensional construct to define the concept. They argued that the IT use and management components in the sophistication construct would be complex and highly interdependent in nature. The IT sophistication model is depicted in Figure 4 below.

Figure 4: Information technology sophistication
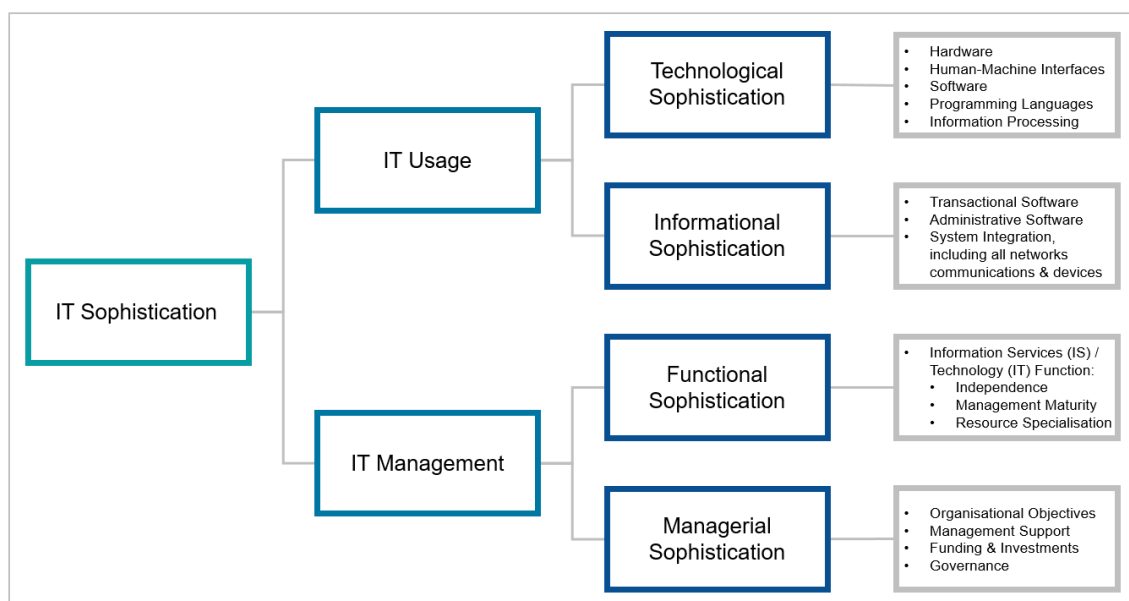
Source: Modified from Raymond and Paré (1992)

Since its introduction, the IT sophistication construct received widespread support (de Búrca et al., 2006; Mansor, Mohamed, Ling & Kasim, 2016) and this study applies the essence of this sophistication definition.

The multidimensional IT sophistication construct consists of two primary components, IT Usage and IT Management, and each is extended into two sub-components (Raymond & Paré, 1992). The first component, **IT usage**, consists of technological and informational sophistication. *Technology sophistication* is an indication of the degrees of diversity and complexity of the IT elements employed in the organisation. This incorporates all hardware and software components, the entire range of programming languages utilised, the sophistication of the human-machine interfaces implemented, and the foremost information processing modes, which may range from batch processing to remote or online data processing (Raymond & Paré, 1992). As a complement, *informational sophistication*, encapsulates the organisation's transactional and administrative software portfolio, as well as the degree of integration between the software systems. System integration is generally enabled through communication networks and devices (both hardware and software) that may provide for integration through the web (Raymond & Paré, 1992). The technological and informational sophistication aspects represent a wide array of computational mechanisms.

IT management, the second component of IT sophistication, similarly consists of two sub-components, being *functional* and managerial *sophistication*. The former provides an indication of the IT function in the organisation in terms of its location and independence, the degree of internal IT specialists employed, as well as the maturity of the processes implemented for the overarching management function of the organisation's IT components. On the other hand, *managerial sophistication* provides an indication of the maturity and formalisation of all the processes implemented to effectively assess, design and control present and future IT systems. The management sophistication sub-component incorporates a comprehensive view, including organisational objectives, management support, funding and investment and all governance aspects (Raymond & Paré, 1992).

Wang, Chang & Heng, (2004) stated that an indication of IT sophistication is the degree and concentration of implementation, as well as the level of integration of the abovementioned components with their various sub-components. Raymond, Pare and Bergeron (1995) stated that it is essential for the various IT components to be aligned with the organisational structures and management functions in order to contribute effectively to the organisation. They confirmed that organisational performance is positively related to IT sophistication (Akma Mohd Salleh, Jusoh & Ruhana Isa, 2010). Studies from de Búrca et al. (2006) further supported the argument that services

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practices and related performance in a services organisation are dependent on the IT sophistication of the organisation. An example of the importance of IT sophistication in financial services organisations can be found where IT sophistication played a central role in customer and supplier relations (Mulligan & Gordon, 2002).

de Búrca et al. (2006) also found that an organisation must be able to provide for a wide variety of requirements and challenges in order to be considered technologically sophisticated. These may range from the need to operate from a robust technical-scientific base to the ability to adapt to the often-disruptive impact of new technologies. Such impact may range from the pace at which existing technologies are rendered obsolete by replacement technologies, to the way that markets are revolutionised by these new technologies.

2.3.2. Moderating impact of information technology

Organisational performance, especially in the contemporary global economic context, received extensive consideration during recent years (de Búrca et al., 2006). IT investments are generally made with the expectation that the organisation making the investment will develop in its technology sophistication, becoming more effective and efficient (Alserhan & Brannick, 2002).

Studies confirmed that an organisation that manages to develop higher levels of IT sophistication will have the opportunity to benefit in a number of areas. These include the alignment of its business and IT strategies (Hussin, King, & Cragg, 2002), the improvement of individual and organisational performance (Mohd-Daud & Mohamed, 2008), and improved business performance, productivity and effectiveness (de Búrca et al., 2006; Ibrahim & Lam, 2012). IT sophistication is therefore applied as moderator to influence the direction and strength of the relationship between a selection of business and performance parameters (Baron & Kenny, 1986), for example the services practices and services performance relationships in certain service-orientated organisations (de Búrca et al., 2006).

Organisations, like financial institutions, that are typically characterised by high volumes of standardised and often automated daily service units, as well as low levels of service customisation and customer contact time, may benefit substantially through the moderator role of IT sophistication (de Búrca et al., 2006; Akma Mohd Salleh et al., 2010).

2.3.3. Spectrum of IT sophistication

IT sophistication is typically expected to materialise in practice on a continuum of sophistication. On the lower end of the continuum only selective IT usage and

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management components may be implemented and functioning with limited degrees of success and sophistication. On the opposite end of the spectrum, and in particular the technology and informational sophistication perspectives, is the relatively new form of computational capability referred to as cognitive computing. Cognitive computing is positioned as a computational archetype that has "learning, reasoning, perception, and natural language processing capabilities" (Noor, 2015, p.76), and is able to act very similarly to the human brain by employing machine interpretations and observations in an independent manner (Fenn, 2015; Pupo, 2014; Schatsky et al., 2014).

The convergence of these technological advances allow a cognitive computing participant to receive an unstructured command spoken in a natural language, perform the necessary research and provide a quality conclusion based on hypothesis analysis (Fenn, 2015). Selected features of these computing participants can therefore be employed in collaborative scenarios where they interact with humans in virtual environments (Prada, 2009).

Some experts position cognitive computing participants as technology components that will augment human competencies, capturing and enhancing human expertise, in an era where human knowledge processing and decision making are challenged by a highly demanding and volatile environment (Russ, 2016). Others however, see the cognitive computing participants as an enabler for the automation of the knowledge worker's job (Rotman, 2013), resulting in the removal of the knowledge worker from that particular position.

> *"The trend to the emerging intelligent revolution is to meet the ultimate human needs. The basic approach to intelligent revolution is to invent and embody cognitive computers, cognitive robots, and cognitive systems that extend human memory capacity, learning ability, wisdom, and creativity."* (Wang, 2014, p. 3)

2.3.4. Impact on the knowledge worker's working environment and job design

Cognitive computing and other intelligent machine participants were presented as a great accomplishment in a variety of territories of human knowledge, exceeding human experts in a selection of scientific and business domains (Pupo, 2014). It makes therefore for an attractive proposition to employ cognitive computing participants in a variety of business sectors in order to provide organisations with a competitive advantage (Bharadwaj, 2000). These participants are, for example, used in roles at managerial and organisational levels to provide various forms of automation, governance and control (Nobre, 2012), which impacts a variety of structural dimensions of the organisation and the knowledge worker's working environment, including the centralisation, formalisation and workplace bureaucratisation.

In a world where cognitive computing participants are starting to continuously collect and assimilate information, find and develop explicit and implicit relationships in the information, and argue reliably about the information, it is expected that an increasing number of job tasks and other activities will be delegated to the computing participants (Chui, Manyika & Miremadi, 2015; Pupo, 2014). Cognitive machine participants are also used in the retrieval of required content from textual communications of persons and businesses as part of the automation of legal content processing (Hogan, Bauer & Brassil, 2010). Pupo (2014) further states that developments may lead to scenarios where human workers may not be directly or even indirectly involved in certain situations due to the pervasiveness of these computing participants.

"We're less used to the thought that the kinds of work done by clerks, or lawyers, or financial analysts, or journalists, or librarians, can be automated. The fact is that it can be, and will be, and in many cases already is" (Lanchester, 2015, p. 1).

2.4. Research opportunity

The chapter provides a review of the relevant academic literature available on the research problem. Based on the review, it is clear that the knowledge worker is considered the enabler through which the majority of organisational resources, including knowledge, are processed and transformed into a sustainable, competitive advantage (Leon, 2011). The value of the knowledge worker and the benefits of their heightened productivity rates were identified as some of the most valuable assets of the 21st century organisation, in particular the knowledge-intensive organisation (Hendarman & Tjakraatmadja, 2012). It is therefore essential for the sustainable development of the organisation to secure the knowledge workers and ensure their continued commitment to the organisation, as well as their heightened productivity rates (Millar & Choi, 2010; Nair & Vohra, 2010). It was also made apparent that the knowledge worker's unique contribution in the modern working environment is becoming increasingly more challenged due to the progressive involvement of sophisticated IT components, which may range from the rudimentary automation of repetitive activities to complex knowledge work (Noor, 2015).

The review also details the precursors and outcomes of workplace alienation of knowledge workers. However, research on work alienation was predominantly focused on the blue-collar or industrial worker (Blauner, 1964; Dean, 1961; Shepard, 1977), with very little literature in current years on alienation among non-factory workers or workers in the contemporary work industries such as the financial services or IT sectors. The available academic material also tends to provide a generic approach to workers,

incorporating manual and knowledge workers into a singular construct, despite their vastly different attributes (Chiaburu et al., 2014).

One exception is the work from Nair and Vohra (2010), where factors predicting work alienation of knowledge workers are explored. The study, however, does not reflect a generalised view of the modern place of work of the knowledge worker that is characterised by technological advances and various degrees of automation. The evolving nature of technology, especially when taking into account the highly advanced features of the cognitive computing agents, may result in the fact that technology does not only feature as an isolated work environment precursor component, but extends into a job design precursor component.

Considering the progression of scholarly attention thus far, a number of areas are thus highlighted to warrant further investigation. Further research was recommended by Chiaburu et al. (2014) who recommended analysis of the work alienating impact of structural elements or conditions, as provided by technology. Research will therefore be focused on the working environment and job design precursors of work alienation. Additionally, the study will investigate whether IT sophistication moderates the relationship between the perceived working environment and perceived work alienation, as well as the perceived job design and perceived work alienation.

Nair and Vohra (2010) also suggested that the study of workplace alienation precursors should be extended to the financial services industry. The study will therefore focus on work alienation experienced by knowledge workers working in contemporary financial services institutions.

With the background provided by the theory and literature review above, the researcher will concentrate on the research questions as specified in the following chapter, which will be tested for the purposes of this research study.

3.   Chapter Three: Research questions

3.1.   Objectives

The objective of the research study was to investigate the impact of ITsophistication on the work alienation experienced by knowledge workers within the context of financial services organisations in the Gauteng province in South Africa. The study sought to determine to what extent the knowledge worker experiences levels of perceived work alienation when subjected to degrees of IT sophistication. The study considered the knowledge workers to be actively employed as either permanent or non-permanent resources in the financial services organisations.

Researchers acknowledged that there is a need to study the alienating impact of structural components of technology (Chiaburu et al., 2014), such as information technology, on knowledge workers in contemporary industries (Nair & Vohra, 2012), instead of simply applying the generalisations from related studies that were performed during the 1960s to 1980s on blue-collar workers in industrial settings. The reviewed literature was used as a basis to propose the research questions, which were positioned as sophisticated statements of the specific research problems that were addressed through this research study, as stated by Malhotra (2010). The research objectives were positioned as three primary research questions.

3.2.   Research Question 1

Existing literature acknowledged the role of the perceived working environment as precursor of work alienation (Chiaburu et al., 2014; Nair & Vohra, 2010). The role of IT sophistication as a contributor in the working environment has not, however, been investigated. First, the impact of the perceived working environment on the perceived work alienation would be analysed, followed by the analyses to establish whether IT sophistication did moderate the relationship between the perceived working environment and the perceived work alienation.

Research Question 1:

Does information technology sophistication moderate the relationship between the perceived working environment and the perceived work alienation experienced by knowledge workers?

3.3. Research Question 2

Existing literature also recognised the role of the perceived job design as precursor of work alienation (Chiaburu et al., 2014; Nair & Vohra, 2010). The impact of the perceived job design on the perceived work alienation would first be analysed, followed by the analyses to establish whether IT sophistication did moderate the relationship between the perceived job design and the perceived work alienation.

Research Question 2:

> Does information technology sophistication moderate the relationship between the perceived job design and the perceived work alienation experienced by knowledge workers?

3.4. Research Question 3

Finally, the impact of the perceived IT sophistication on the perceived work alienation would be analysed, drawing from the results from research questions 1 and 2.

Research Question 3:

> Does information technology sophistication impact the perceived work alienation of knowledge workers?

The research methodology and design that were employed to address the abovementioned research questions are discussed in the following chapter.

4. Chapter Four: Research methodology and design

The previous chapter presented the research questions that were developed for this study after the literature review presented in Chapter 2. This chapter details the research methodology and design considerations that were used to design, accumulate and examine the data that forms the basis for the research process applied in this study (Saunders & Lewis, 2012).

Contemporary knowledge organisations experience a proliferation of IT solutions to augment and even substitute knowledge workers without necessarily realising what the degrees of workplace alienation may be as experienced by the knowledge workers (Millar & Choi, 2010; Nair & Vohra, 2010). The purpose of this study was to develop a deeper understanding of the relationship between the IT sophistication in the working environment and the worker's job design, and the workplace alienation experienced by the knowledge worker. The methods employed in this study were designed to firstly leverage preceding contemporary research works in order to provide a view on existing statements regarding the perceived workplace alienation of knowledge workers, as well as to contribute to the current, established concepts with the introduction of IT sophistication in the context of perceived work alienation. Figure 5 below depicts the selected research methodology elements that were employed in the study.

Figure 5:   Research methodology overview
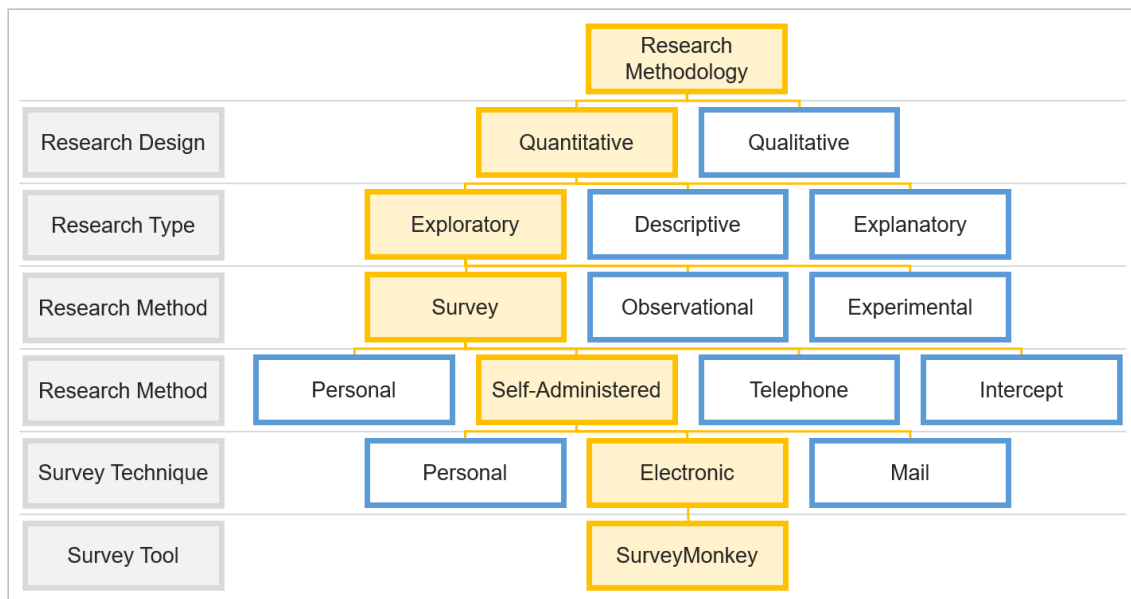
Source: Adopted from Malhotra, 2010

4.1. Research methodology and design

The research design details the methodology rationale implemented for the research study, incorporating the methods used to acquire and process the data in order to answer the research questions and to achieve the research objectives (Malhotra, 2010). The research study was grounded in a positivist philosophy, known to employ objectively framed processes that seek scientific rigour and generalisability of findings (Saunders & Lewis, 2012). A descriptive, quantitative research method was employed since it applies a neutral approach to create meaning through the data that was gathered (MacKinnon, Fritz, Williams & Lockwood, 2007).

Academic literature relevant to the research subject was generally available. A detailed review of the literature was initially used as an exploratory research technique in order to create new perceptions into the research field (Saunders & Lewis, 2012), which was further developed into a descriptive technique. The technique was aimed at accurately reflecting the interaction between instigators, conditions and activities (Saunders & Lewis, 2012). The descriptive approach was positioned as one where the researcher objectively measures reality by employing post-positivist philosophical thinking in the application of variables, research questions, measurements and observations in a structured manner (Zikmund, Babin, Carr & Griffin, 2012). Data was collected through pre-determined survey questionnaires; a recommended strategy for post-positivist research (Creswell, Plano Clark, Gutmann & Hanson, 2003). The collected data was reduced to statistical data for ease of analysis and interpretation (Creswell et al., 2003; MacKinnon et al., 2007). Conclusions were then drawn from the data samples and further developed into inferences aligned with the respondent population. The research design as described formed the basis for the research techniques and procedures.

4.2. Population

Saunders and Lewis (2012) positioned a population as the complete set of members of a grouping that share a mutual set of attributes or characteristics (Khalid, Hilman & Kumar, 2012). The population of this research study comprised of all knowledge workers that were either directly or indirectly employed by all the South African or multi-national financial services and banking institutions in South Africa. The population was chosen as it is believed to be a well-represented population.

4.3. Sampling

A sample is a subset of the total population (Saunders & Lewis, 2012). Blumberg, Cooper and Schindler (2014) stated that sampling represents any process that analyses this subset in order to draw conclusions regarding the population.

The researcher targeted participation by individuals who were employed at financial services and banking institutions in the Gauteng province at the time. The Gauteng province is considered the financial hub for South Africa, as well as Africa, and hence provided an appropriate setting to investigate developments in the banking and financial services sector for the country. The province boasted 10 locally controlled banks, 15 branches of foreign banks and 38 representative offices of foreign banks and financial services institutions that operated from this region (South African Reserve Bank, 2016).

Since the majority of the participants were expected to be involved with Barclays Africa Group Limited, approval to approach individuals for participation was requested from the organisation. Additionally, individuals were also approached that were employed at Capitec Bank, First National Bank, Investec, JP Morgan, MMI Holdings Limited, Nedbank, the South African Reserve Bank and Standard Bank of South Africa. These were all financial services and banking institutions formally recognised at the time by the South African Reserve Bank (South African Reserve Bank, 2016).

4.3.1. Sampling technique

For the purpose of this research study, a non-probability, purposive sampling method was used to select the sample members. Purposive sampling is a non-probability sampling method where the researcher's judgement is used to select respondents that will be best suited to meet the research objectives and to answer the research questions (Zickmund et al., 2012). Even though the method is arbitrary and subjective (Cooper & Schindler, 2014), it was considered to be more appropriate due to the fact that the focus would be on knowledge workers specifically employed or contracted by financial services institutions. Additionally, in order to support the generalisability of findings, participants were identified that would contribute to a balanced profile of the sample regarding age, gender, ethnicity, tenure, appointment levels, as well as education levels.

The confined magnitude of this sampling frame, and the possibility of additional limiting factors that were anticipated from various financial institutions, restricting access to the sampling units due to confidentialities motivated the prudence of the chosen sampling strategy.

4.3.2. Sample size

Based on data published by Statistics South Africa (2016), the financial services and banking institutions in Gauteng, South Africa, employed approximately 1,057,000 workers at the end of the second quarter of 2016. Davenport (2005) suggested that knowledge workers comprised 30% to 50% of a modern knowledge economy workforce

and that the figure is growing. The number of knowledge workers employed in the Gauteng province would therefore equate to approximately 529,000.

The benchmark response rate for questionnaires that are targeted at organisational representatives ranges between 35% to 40% (Baruch & Holtom, 2008). Taking into account the recommended response rates and the need to achieve comparable representation of the population (Wegner, 2012), 500 potential respondents were contacted to participate in the survey. The selected confidence level for the study was 95% with a 5% margin of error (Zickmund et al., 2012).

4.4. Unit of analysis

The unit of analysis is the object that information is being gathered on, and is being measured or observed (Wegner, 2012). The unit of analysis for the study was the person or individual knowledge worker, employed at any of the relevant offices of the financial services institutions operating within the Gauteng province of South Africa.

4.5. Research instrument / measurement

4.5.1. Design

The study required the collection of data regarding the alienating impact of IT sophistication in the knowledge worker's place of work. A self-administered, English-based online questionnaire was therefore developed to obtain similar information from a potentially large number of respondents (Saunders & Lewis, 2012). Malhotra (2010) stated that a survey offers a variety of benefits, including the uncomplicated crafting and administering of the survey, as well as the analysis of the resulting data, which supports the limitation of variability that can be introduced by respondents. Additional benefits of the online questionnaire were the speed of administering and completing the questionnaire, limiting interviewer bias and high levels of perceived confidentiality and simplicity by the respondents. The online survey tool was considered to be the most easily accessible platform and hence more likely to ensure a good rate of response, whilst being cost effective (Couper, 2000). Disadvantages introduced by surveys, however, included the possible lower completion rates of the surveys, possible sensitivity with regards to some of the required information and the lack of control over the sample participants (Malhotra, 2010).

Part One of the questionnaire contained questions that were predominantly focused on the selected structural and perceived work alienation categories. The constructs from the literature study in Chapter Two guided the basic framework for the questionnaire

structure. More specifically, the following areas were investigated in Part One of the questionnaire:

1. Working Environment
2. Job Design and Characteristics
3. Information Technology Sophistication
4. Knowledge Characteristics
5. Work Alienation, the dependent variable

The structural precursor questions representing the work environment and job design constructs, as well as the knowledge characteristics construct, were based on the questions that were developed by Morgeson and Humphrey (2006). In parallel, the information technology sophistication construct questions were derived from the model produced by Raymond and Paré (1992). The work alienation construct questions were based on the eight-item Likert scale produced and tested by Nair and Vohra (2009).

The questions for Part One of the questionnaire were fixed-alternative questions, providing for predetermined feedback based on a seven-point Likert scale (Malhotra, 2010). The respondents were asked to express their views to rate aspects of the constructs on a continuum that ranged from 1 (strongly disagree) to 7 (strongly agree) (Morgeson & Humphrey, 2006; Nair & Vohra, 2009). The scales were anchored with the mentioned primary descriptors at its extremes, whilst the scale components in-between were represented by intermediary scale descriptors (Hair, Money, Samouel & Page, 2007).

Part Two of the questionnaire provided demographic data that could be used to describe the population. Saunders and Lewis (2012) recommended that the demographic questions should be asked last in the questionnaire. The questionnaire was carefully constructed to capture sufficiently descriptive demographic detail whilst ensuring skilful navigation of potentially sensitive topics, such as culture. The questions were predominantly determinant-choice questions where respondents were asked to select an answer for a question from a pre-determined list of options (Zikmund et al., 2012). Answers were provided for the age, gender, ethnicity, education, tenure and appointment level questions.

Saunders and Lewis (2012) directed that research should be performed in an ethical manner to protect the welfare of research participants. The research survey therefore included a cover page with a statement informing potential participants of the purpose of the survey, its confidential nature and of the fact that respondents' participation would be completely voluntary. A qualifying question was also implemented to identify whether

respondents were either directly or indirectly employed at a financial services institution at the time. If not, the respondent's data could not be included.

A copy of the survey questionnaire is available in Appendix A.

4.5.2. Pre-testing of the questionnaire

The questionnaire was subjected to two rounds of pre-testing and quality assurance checks. Saunders and Lewis (2012) recommended the pre-testing of a questionnaire to allow the researcher to check for potential errors in the formulation and interpretation of the questions, as well as the survey instructions.

The original questionnaire was developed on the Survey Planet platform, an online survey tool available at https://surveyplanet.com/. The online questionnaire was made available to five respondents, with the initial objective to test not only the suitability and clarity of the survey questions, but also the accessibility, ease of use and duration to complete the survey. Whilst the feedback suggested that some adjustments were required to the survey questions, the response times to populate the online survey on the respondents' computer equipment were unacceptably slow. Financial institutions by default implement severe security restrictions on their employees' computing equipment in order to satisfy the stringent security requirements of the environment, which rendered the Survey Planet-based survey tool to be either unresponsive or too restricted to be usable.

A second iteration of the survey questionnaire was developed on the Survey Monkey online platform, available at *https://www.surveymonkey.com/*. The feedback from the first pre-test, including all the suggested enhancements, was used to improve the questionnaire and was made available to 15 respondents, of which 10 completed the questionnaire in full. Feedback from the respondents was generally positive, and they indicated that the questions were unambiguous and easy to address. The online tool's performance across a variety of computer devices was also rated as acceptable.

4.6. Data collection

Ethical clearance for the research study was granted by the Gordon Institute of Business Science's (GIBS) ethical clearance committee. A copy of the approval letter is available in Appendix C.

Once ethical clearance was granted, the researcher sent requests for participation via electronic mail (email) directly to 500 respondents who were classified as being part of the population group. The email included information recommended by Saunders and Lewis (2012) such as the research information and motivation, confidentiality information

and contact details for the researcher and research supervisor. The email also included a hyperlink to the online survey, allowing the respondents convenient access to the survey, as well as the immediate capturing of the data (Hair et al., 2007). Limited context had to be provided to the respondents, but was carefully controlled to guarantee minimal degrees of influence, assisting with the mitigation of response biases. The data collection process took place from 25 September to 15 October 2016, providing a three-week period for the collection of the data.

On reviewing the responses, it was recorded that 239 (47.80%) of the 500 respondents acted on the survey participation requests. The survey was eventually completed in full by 216 respondents. The response rate of 43.20% was higher than the recommended benchmark response rate of 35% to 40% for questionnaires targeted at organisational representatives, as stated by Baruch and Holtom (2008).

4.7. Data analysis

4.7.1. Data preparation

A Microsoft Excel data file was extracted from the online survey tool, SurveyMonkey (n.d.). The collected data required a level of cleansing and coding before it could be analysed, primarily to increase the accuracy of the data (Malhotra, 2010). The data for the respondents that indicated that they were no longer involved in a financial services institution and did not meet the selection criteria, were removed. Similarly, the data for the respondents that did not complete the survey in its entirety were also removed from the data set.

The ratings for each of the Likert scale responses were converted by the SurveyMonkey (n.d.) survey tool to a numerical value ranging between 1 and 7. Additionally, the questions pertaining the demographic aspects of the questionnaire were also converted to numeric values that represented the number of options offered to the respondent, starting at one.

Additionally, the organisational support (WE2) variables in the working environment construct, indicated in Table 1 below, required reverse coding to support the rationale of the working environment construct that higher levels of the perceived working environment influence would contribute to higher levels of perceived work alienation, as experienced by the knowledge workers.

Table 1:   Variables of the working environment construct

Construct	Construct Variables
Working Environment 1 (Independent variable)	WE1.1 The organisation has a hierarchy of authority, responsible for planning and decision making (Centralisation)
	WE1.2 The organisation closely monitors adherence to the rules, policies and procedures (Formalisation)
	WE1.3 The job is governed by a complex set of rules, policies and procedures (Bureaucracy)
Working Environment 2 (Independent variable)	WE2.1 The job allows me to participate in decisions that will affect the organisation as a whole (Organisational Support)
	WE2.2 The organisation provides direct and clear information that my contribution is valued (Organisational Support)
	WE2.3 The job and its required activities are clearly specified (Organisational Support)

Once the data was organised in Microsoft Excel, it was imported into the IBM statistical software, Statistical Package for Social Sciences (SPSS) Version 24 (2016), for analysis and to perform the statistical analysis on all of the collected data. A series of tests were performed on the collected data leading to the drafting and evaluation of assumptions in order for more sophisticated statistical tests to be completed (Zikmund et al., 2012).

4.7.2. Descriptive analysis of the sample and theoretical constructs

The first section of the questionnaire comprised of 33 questions based on a 7-point Likert scale, through which categorical ranked (ordinal) data was collected. The Likert scales produced data that was produced in an absolute order. Demographic data was collected through the second section of the questionnaire, where the categorical data collected was descriptive in nature (Saunders & Lewis, 2012).

Only non-parametric techniques were recommended by Pallant (2010) to be used when data are measured on nominal (categorical) or ordinal (ranked) scales. However, if tests were only to be limited to non-parametric techniques, a number of required parametric techniques would have to be excluded from the research analyses. Clason and Dormody (1994) argued that Rensis Likert stated that for each Likert scale question there may exist an inherent continuous variable. Norman (2010) further argued that "Parametric statistics can be used with Likert data, …, with unequal variances, and with non-normal distributions, with no fear of ''coming to the wrong conclusion''." (Norman, 2010, p. 7). Zikmund et al. (2012) further supported the argument by stating that when a Likert scale with five or more points was implemented to gather research data, that particular data value could be used as an interval scale type, therefore allowing for interval descriptive statistics methods to be applied. Additionally, a small number of parametric tests were also included in the statistical analyses of the data, and are addressed in more detail in the following sections.

A variety of descriptive statistics were generated in order to provide a more detailed understanding of the sample as well as the theoretical constructs (Zikmund et al., 2012).

4.7.3. Reliability, internal consistency and validity

Due to the nature of the research study, a test-retest approach to test the reliability of the data for each theoretical construct would not be feasible (Zikmund et al., 2012). Instead, Cronbach's alpha coefficient tests were rather applied to verify the internal consistency of each theoretical construct (Pallant, 2010). Scale scores were summated where the Cronbach value for the relevant construct was found to be higher than 0.7 (Zikmund et al., 2012).

4.7.4. Statistical reduction

Factor analysis was used to reduce the number of scale items for constructs, where required. Variables would be highlighted through the analysis that would still describe the underlying construct structure. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of sphericity were applied to verify the acceptable levels for the Factor analysis (Pallant, 2010).

4.7.5. Spearman's rho

The non-parametric test implemented to verify the correlation between ranked or categorical variables was Spearman's Rank Order Correlation test. The test was used for all the correlation tests between the various theoretical constructs (Pallant, 2010).

4.7.6. Kruskal-Wallis Analysis

The Kruskal-Wallis test was used to analyse the relationship between one categorical independent variable, for instance a demographic variable, and the continuous dependent variable, work alienation. Work alienation was treated as a continuous variable, based on the direction provided by Norman (2010) and Zikmund et al. (2012).

4.7.7. Partial correlation

Partial correlation tests were employed to test whether information technology sophistication (controlling for) moderated the relationships between work alienation (continuous dependent variable) and the working environment and job design constructs (Pallant, 2010).

4.7.8. Multiple regression

The standard multiple regression tests were used to verify the unique contribution that each independent variable made in the prediction of the dependent variable, work alienation (Pallant, 2010).

4.8.   Research limitations

The research design and methodology selected for this study introduced a number of limitations, which may have materialised in the execution of the study.   The non-probability, purposive sampling method that was implemented, was expected to exclude significant portions of the population, which may have resulted in an unrepresentative target population.   Under such conditions, bias becomes a concern influencing the findings (Wegner, 2012).   Additionally, it was impossible to sufficiently test the sampling error from the sample data, implying that it would not be valid to draw statistical inferences from the non-probability sample data (Wegner, 2012).

Non-response biases may also have been introduced where respondents did not complete the online survey due to time limitations or due to a possible misinterpretation of the qualifying question that was implemented to ensure that respondents were actively employed at financial service institutions.   It was also the case that in some instances the targeted recipients were no longer employed at the identified financial institutions.

4.9.   Summary of the research methodology and design

This chapter detailed the research methodology and design employed by the researcher, including the process applied to design and implement this research report.   The research objectives in the context of the research philosophy were explained, whilst the sample, population and unit of analysis were also detailed.

5.   Chapter Five: Results

The Results chapter presents the most prominent results from the statistical analyses performed on the data that was collected. A general overview and interpretation of the collected data is presented based on a descriptive analysis of the sample and the theoretical constructs. The research constructs are then analysed as per the research questions and the results are presented, as depicted in the Figure 6 below.

Figure 6:   Data analysis process and presentation
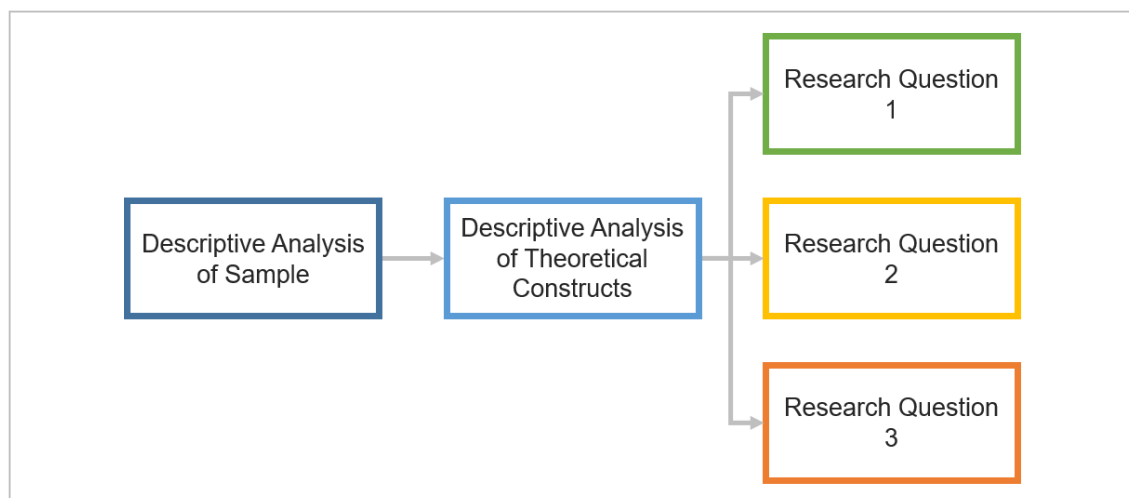
5.1. Descriptive analysis of the sample

The survey was distributed to 500 potential respondents that were identified to be either directly or indirectly employed in financial services institutions in the Gauteng province in South Africa. A total of 239 (47.80%) respondents reacted on the request to participate. Five of the respondents indicated that they were no longer involved in a financial services institution and hence did not meet the selection criteria. Another 18 respondents did not complete the survey in its entirety and their responses were therefore removed from the data set. The survey was eventually successfully completed in full by 216 respondents, signifying a final response rate of 43.20%. The response rate surpassed the recommended benchmark response rate of 35% to 40% for questionnaires targeted at organisational representatives (Baruch & Holtom, 2008).

Sample demographic information was gathered through the survey in order to describe the characteristics of the sample (Zikmund et al., 2012). A brief overview of each category is presented in the following sections addressing age profiles and gender balance attained. Profiles of respondents by ethnicity, level of education, work tenure and seniority are also discussed.

5.1.1. Age

The age profile for the respondents is depicted in Table 2. In total, 92.59% of the respondents were 30 years of age and older, with the 30 to 44 Years group representing the biggest group of respondents, namely 109 (50.46%).

Table 2:   Age profile for the respondents

Category	Response Numbers	Response Percentage
Younger than 18 years	0	0.00%
18 to 29 years	16	7.41%
30 to 44 years	109	50.46%
45 to 59 years	85	39.35%
60 years and older	6	2.78%

Figure 7 illustrates the frequency distribution for the respondents' age groups.

Figure 7:   Frequency distribution for the age groups
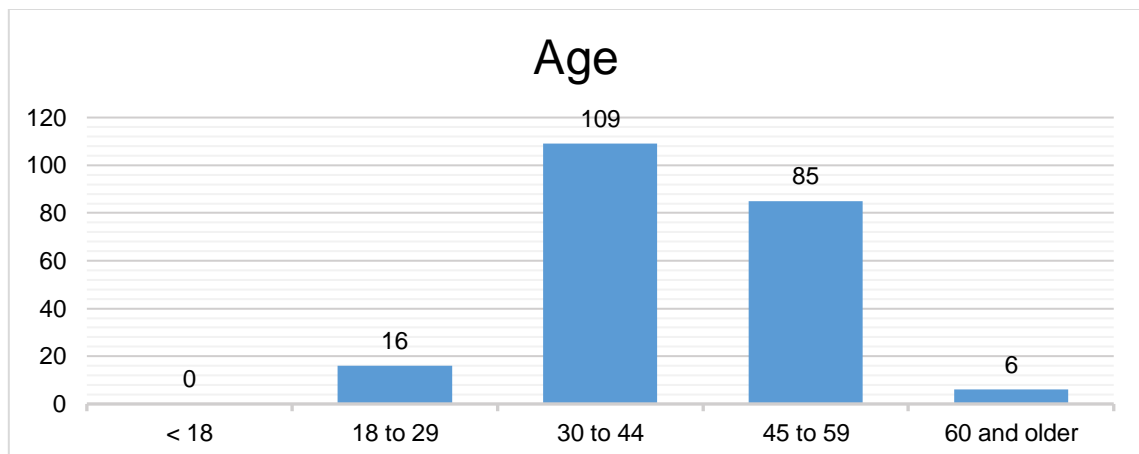
5.1.2. Gender

53.70% of the respondents selected Male as gender, whilst the remaining 46.30% selected the Female option. None of the respondents selected the option, 'Other'. Figure 8 illustrates the frequency distribution for the gender groups.

Figure 8:   Frequency distribution for the gender groups
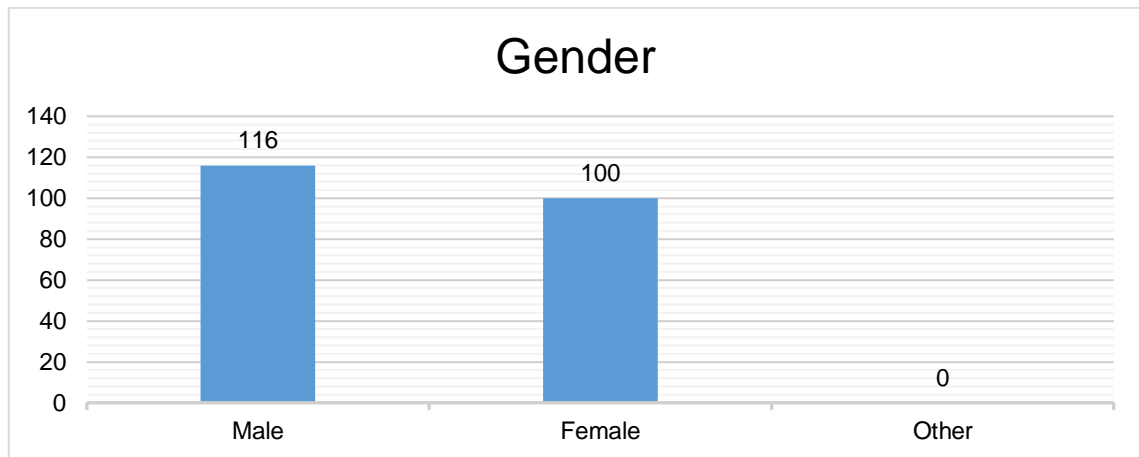
5.1.3. Ethnicity

The respondents were predominantly from a White / Caucasian background (65.28%), followed by the African (14.35%) and Indian / Asian (12.04%) ethnic groups.   The ethnicity profile of the respondents is detailed in Table 3, whilst Figure 9 illustrates the frequency distribution by ethnic groupings.

Table 3:   Ethnicity profile for the respondents

Category	Response Numbers	Response Percentage
African	31	14.35%
Coloured	16	7.41%
Indian / Asian	26	12.04%
White / Caucasian	141	65.28%
Multiple Ethnicity / Other	2	0.93%

Figure 9:   Frequency distribution for the ethnicity groups
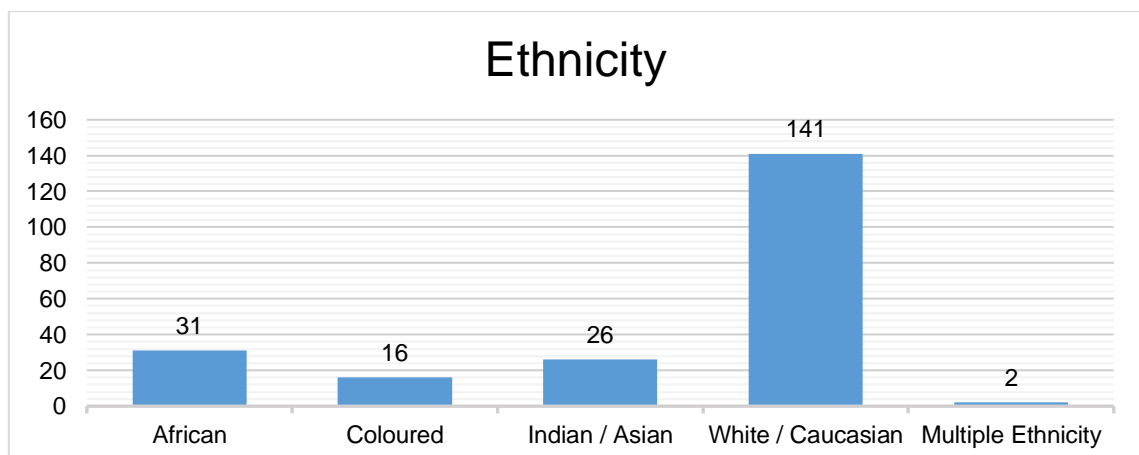
5.1.4. Education level

Dewhurst et al. (2013) and Brinkley (2006) defined the knowledge worker as a person who should have high skill levels, displayed through degree or degree equivalent qualifications that start from a NQ level 4 (NQ4) education. The NQ4 qualification is based on a wide variety of criteria like information processing, resolving of problems, knowledge and other capabilities, but is not considered to be a direct equivalent of the South African National Senior Certificate qualification, which is a high school Grade 12 or Matric certification (South African Qualifications Authority, 2012). The education profile for the respondents is detailed in Table 4. Figure 10 displays the frequency distribution for the respondents' highest education level.

Table 4:   Education profile for the respondents

Category	Response Numbers	Response Percentage
No high school	0	0.00%
High school graduate	25	11.57%
Tertiary diploma or equivalent	61	28.24%
3-Year degree	40	18.52%
4-Year degree	28	12.96%
Post-graduate degree	62	28.70%

Figure 10:   Frequency distribution for tenure
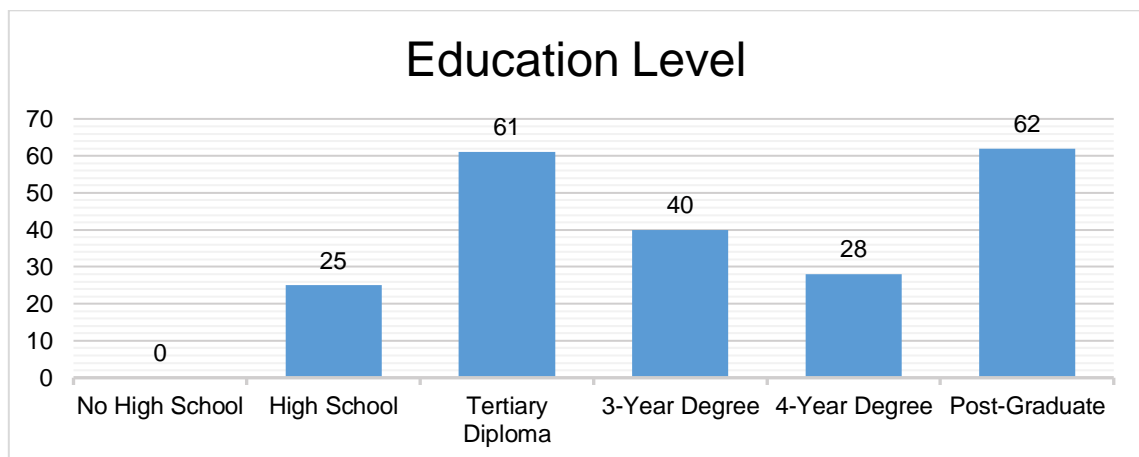
Of all the respondents, 88.43% indicated that they have an education level higher than a high school Grade 12 certification. It was also interesting to note that there was a total of 62 (28.70%) of the respondents who indicated that they achieved a post-graduate education level, which was the highest number for any of the individual education levels available in the survey.

5.1.5. Tenure at the organisation

Respondents were asked to indicate their tenure at the current financial services institution, whether directly or indirectly employed at the institution. The details for the respondents' tenure profile are detailed in Table 5.

Table 5:   Tenure profile for the respondents

Category	Response Numbers	Response Percentage
2 Years or less	43	19.91%
3 to 5 Years	60	27.78%
6 to 10 Years	39	18.06%
11 to 15 Years	16	7.41%
16 Years and more	58	26.85%

It was interesting to note that almost half (47.69%) of the respondents indicated a tenure at the current organisation of between zero and five years, even though 92.59% of the respondents indicated that they were 30 years of age and older. The tenure results from the research study by João and Coetzee (2012) involving financial services institutions in South Africa were similar, but the majority of the respondents were younger than 30 years of age. It is also noteworthy that 58 (26.85%) of the respondents indicated a tenure of 16 years and longer at the current institution. Figure 11 illustrates the frequency distribution for the tenure groups.

Figure 11: Frequency distribution for respondents' tenure at the organisation
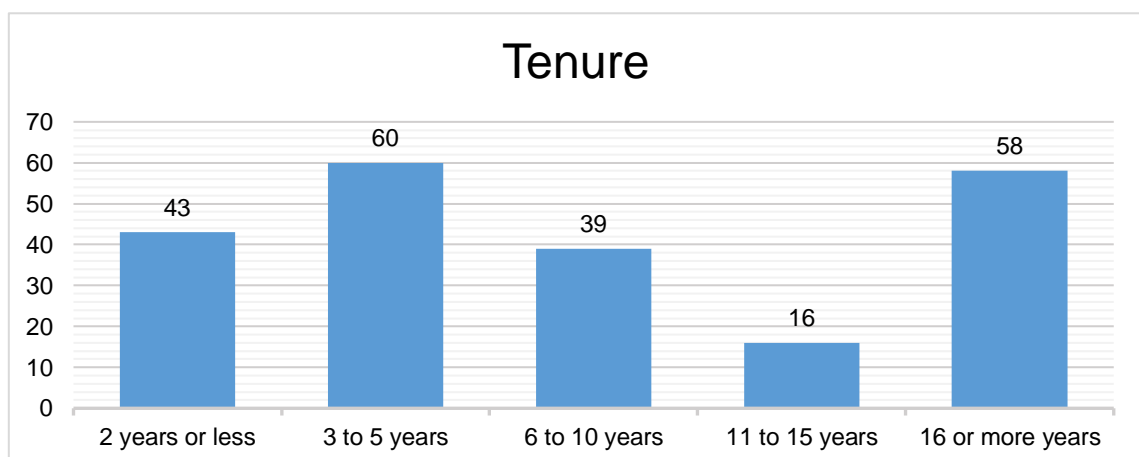
5.1.6. Appointment level

The Appointment profile for the respondents show that the highest representation for appointment level was Manager, with 107 (49.54%) respondents, followed by 52 (24.07%) Senior respondents. Brinkley (2006) argued that the knowledge worker should

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be a person who is typically included in the top three standard occupational classifications, like managers, professionals and associate professionals. 92.13% of the respondents indicated that they were appointed in Senior to Executive positions, as indicated in Table 6 below.

Table 6:   Appointment profile for the respondents

Category	Response Numbers	Response Percentage
Trainee	0	0.00%
Assistant	2	0.93%
Junior	15	6.94%
Senior	52	24.07%
Lead	28	12.96%
Manager	107	49.54%
Director	7	3.24%
Executive	5	2.31%

Figure 12 illustrates the frequency distribution for the respondents' appointment levels.

Figure 12: Frequency distribution for the appointment level groups
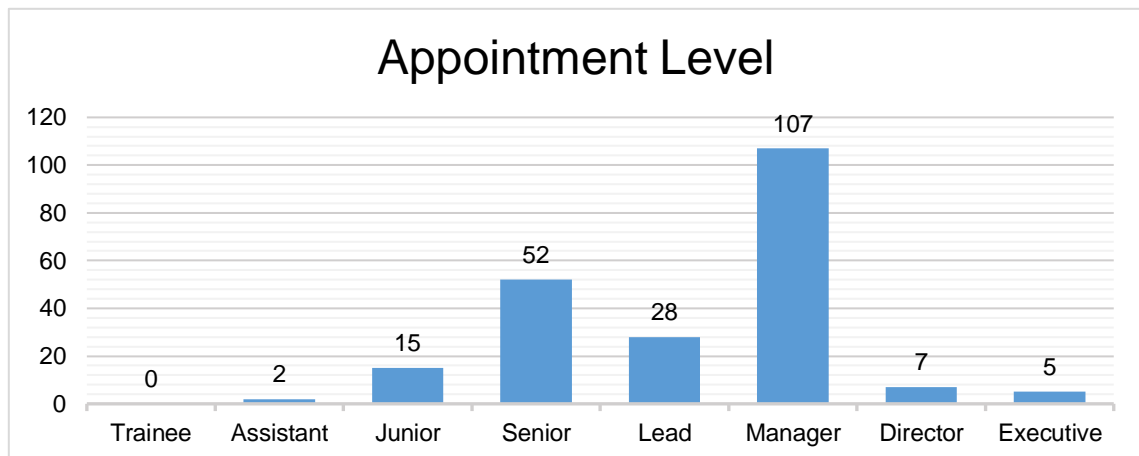
5.2. Descriptive analysis of the theoretical constructs

Theoretical constructs were created to provide abstractions of the information technology sophistication, working environment, job design, knowledge characteristics and the workplace alienation concepts (Zikmund et al., 2007). Respondents' views of the characteristics of the theoretical constructs were measured through a seven-point Likert scale. A frequency analysis was performed on the data (Pallant, 2010) and a summary of the results is provided in the following table.

Table 7: Summary of the theoretical constructs

Construct	Cron-bach alpha	Construct Variables	Median	Range	Min.	Max.
Working Environment 1 (Independent variable)	0.335	WE1.1 The organisation has a hierarchy of authority, responsible for planning and decision making (Centralisation)	6.00	6	1	7
		WE1.2 The organisation closely monitors adherence to the rules, policies and procedures (Formalisation)	6.00	6	1	7
		WE1.3 The job is governed by a complex set of rules, policies and procedures (Bureaucracy)	6.00	6	1	7
Working Environment 2 (Independent variable)	0.722	WE2.1 The job allows me to participate in decisions that will affect the organisation as a whole (Organisational Support)	3.00	6	1	7
		WE2.2 The organisation provides direct and clear information that my contribution is valued (Organisational Support)	3.00	6	1	7
		WE2.3 The job and its required activities are clearly specified (Organisational Support)	2.00	6	1	7
Information Technology Sophistication (Independent variable)	0.834	IT.1 The organisation uses a wide variety of sophisticated hardware, software, programming languages and data processing capabilities	6.00	6	1	7
		IT.2 The organisation uses a wide variety of transactional and administrative software systems, with high levels of integration and communication between the systems	6.00	6	1	7
		IT.3 The organisation has a dedicated IT department, through which mature IT processes are implemented by a variety of IT specialists	6.00	6	1	7
		IT.4 IT in the organisation is managed through mature processes that cover all management aspects, including strategy execution, funding and governance, to name but a few	6.00	6	1	7
		IT.5 Many processes in my job environment are computerised	6.00	6	1	7
		IT.6 Adherence to rules, policies and procedures applicable to my job are closely monitored by computerised systems	5.00	6	1	7
		IT.7 My job requires me to exchange a lot of information with computer systems	6.00	6	1	7
Job Design (Independent variable)	0.725	JD.1 The job allows me to plan how I do my work	2.00	6	1	7
		JD.2 The job allows me to make a lot of decisions on my own	2.50	6	1	7
		JD.3 The job allows me to decide on my own how to go about doing my work	2.00	6	1	7
		JD.4 The job requires the performance of a wide range of tasks	2.00	5	1	6

Construct	Cron-bach alpha	Construct Variables	Median	Range	Min.	Max.
		JD.5 The work activities themselves provide direct and clear information about the effectiveness (e.g., quality and quantity) of my job performance	3.00	6	1	7
		JD.6 The results of my work are likely to significantly affect the lives of other people	2.00	6	1	7
		JD.7 The job involves completing a piece of work that has an obvious beginning and end	3.00	6	1	7
Knowledge Characteristic (Independent variable)	0.821	KC.1 The job involves performing relatively complicated tasks.	6.00	6	1	7
		KC.2 The job requires me to analyse a lot of information	6.00	6	1	7
		KC.3 The job involves solving problems that have no obvious correct answer	6.00	6	1	7
		KC.4 The job requires me to use a variety of complex or high-level skills	6.00	6	1	7
		KC.5 The job requires very specialized knowledge and skills	6.00	6	1	7
Work Alienation (Dependent Variable)	0.937	WA.1 I do not enjoy my work	2.00	6	1	7
		WA.2 Facing my daily tasks is a painful and boring experience	2.00	6	1	7
		WA.3 Work to me is more like a chore or a burden	2.00	6	1	7
		WA.4 I feel estranged / disconnected from myself	2.00	6	1	7
		WA.5 I often wish I were doing something else	2.00	6	1	7
		WA.6 Over the years, I have become disillusioned about my work	2.00	6	1	7
		WA.7 I do not feel like putting in my best effort at work	2.00	6	1	7
		WA.8 I do not feel connected to the events in my workplace	2.00	6	1	7

Basic statistical analysis tests were also performed on the abovementioned constructs and the results are discussed in the following sections.

5.2.1. Working environment

The working environment construct represents structural or physical work alienation precursors that would be found in the working environment, including centralisation, formalisation and workplace bureaucracy (grouped together as the WE1 variables in Table 7), as well as organisational support (grouped together as the WE2 variables in Table 7). The working environment construct was an independent variable.

The working environment construct was based on the seven-point Likert scale that was developed and validated by Morgeson and Humphrey (2006). Technology, and

specifically IT sophistication, was not sufficiently covered in the original scale by Morgeson and Humphrey (2006) and a separate scale was therefore implemented for IT sophistication for the purposes of this research study.

The Cronbach Alpha value based on standardised items for the combined working environment construct was -0.112, suggesting that the internal consistency for the construct was poor and that a negative average covariance existed among the construct variables. Analysis on a construct level would therefore be inappropriate. The construct was divided into two sub-constructs, representing the WE1 and WE2 variables respectively (Zikmund et al., 2012). The Cronbach Alpha value for the WE1 sub-construct was 0.335, which was aligned with Pallant's (2010) argument that a scale with fewer than ten items will probably have a Cronbach Alpha value that is very small. The Cronbach Alpha value based for the WE2 sub-construct was 0.722 and was acceptable (Peterson, 1994). Since all the WE2 variables focused on the organisational aspects of the sub-construct, a Factor analysis was performed to identify the primary variable(s) that would sufficiently describe the sub-construct (Hair, Black, Babin, and Anderson, 2009). The results from the analysis showed a Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) value of 0.623 and the Bartlett's test value was significant ($p = 0.000$); therefore, the factor analysis was deemed appropriate (Pallant, 2010). The first component of the sub-construct was nominated, explaining a cumulative 64.455% of the variance for the sub-construct. The frequency distributions for the centralisation, formalisation and bureaucracy variables are depicted in Figures 13, 14 and 15 below.

Figure 13:   Frequency distribution for the centralisation variable
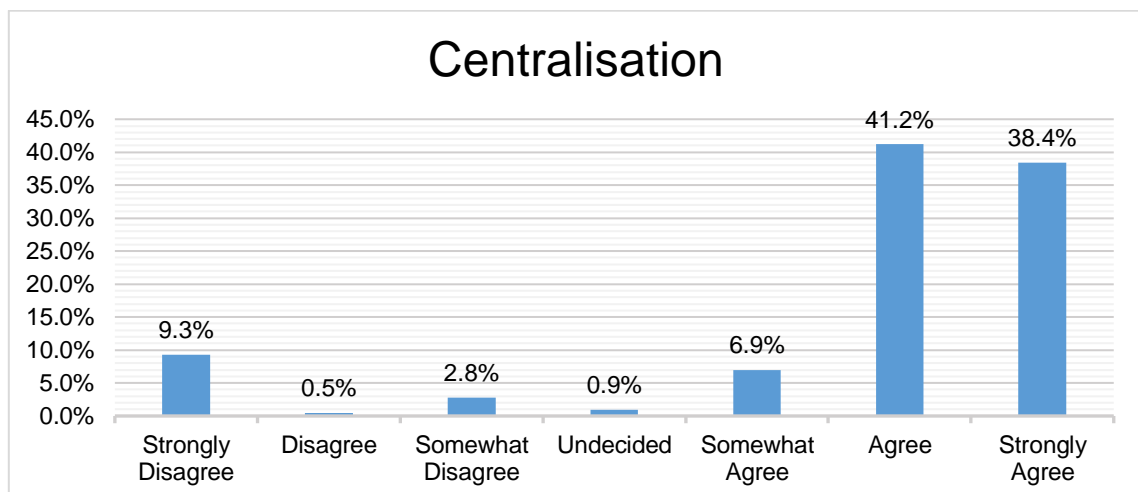
The respondents (86.57%) predominantly agreed that their organisations were characterised by a hierarchy of authority, which should generally result in reduced levels of involvement and participation from the knowledge worker (Chiaburu et al., 2014).

Figure 14:   Frequency distribution for the formalisation variable
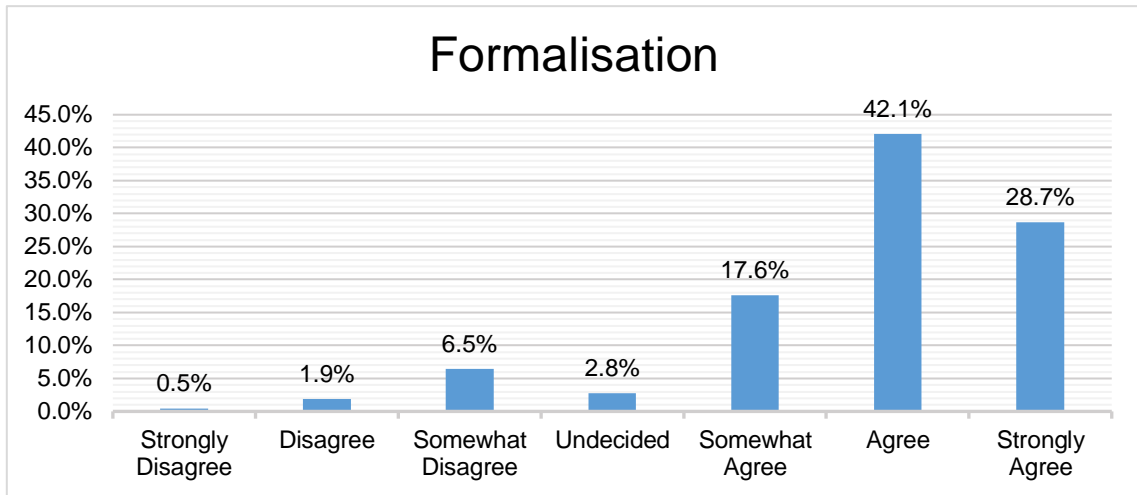
Formalisation

The majority (88.43%) of respondents agreed that their organisations implemented formalisation through policies, procedures and rules, which included the supervision in rule adherence and the specification of jobs (Chiaburu et al., 2014).

Figure 15:   Frequency distribution for the bureaucracy variable
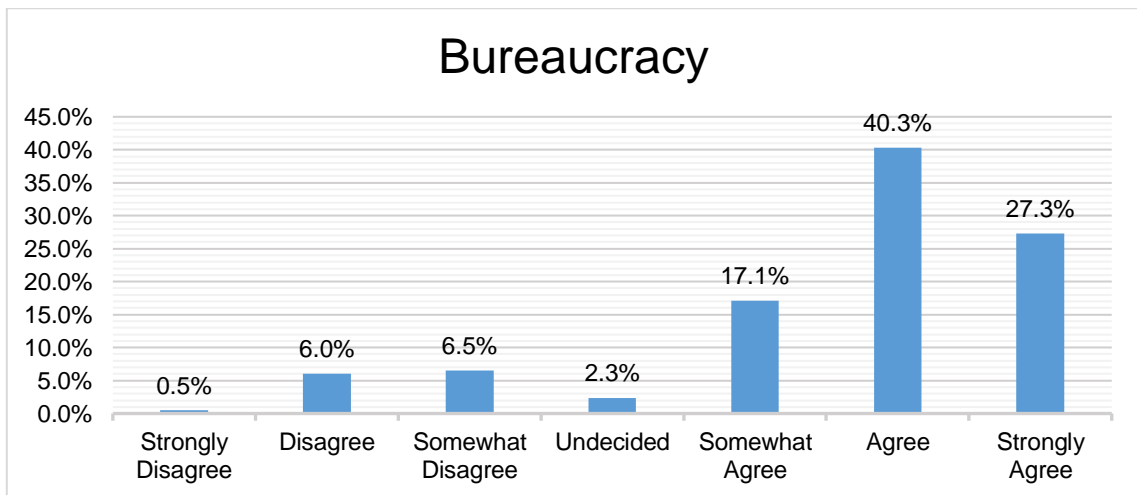
Bureaucracy

Again, respondents predominantly agreed (84.72%) that their organisations implemented increased levels of bureaucracy, therefore procedures and governance controls were progressively added over time in an effort to exercise more rigorous management control (Nair & Vohra, 2010).

Organisational support reflects the degree to which the worker's involvement is valued in the organisation, positively contributing to the worker's emotional, intellectual and even physical resources (Eisenberger et al., 1990). The scores for the WE2 organisational support variables were therefore reversed to support the rationale for the working environment construct that higher levels of perceived working environment would result in higher levels of perceived work alienation. Based on the revered scores, 79.20% of the respondents indicated that they received high to medium levels of organisational support, despite the high levels of centralisation, formalisation and bureaucracy

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experienced in the working environments. Figure 16 displays the frequency distribution for the organizational support variable.

Figure 16:   Frequency distribution for the organizational support variable
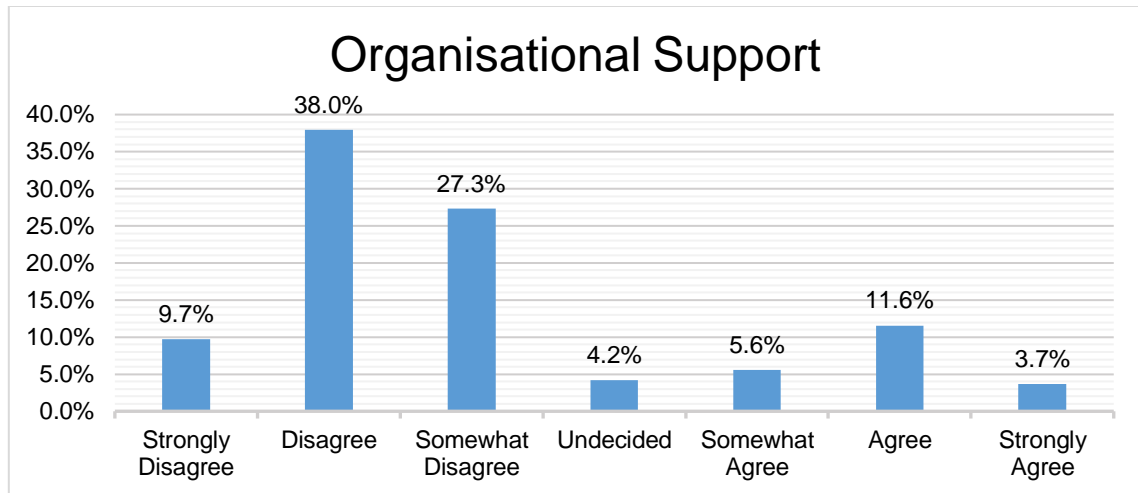
5.2.2. Information technology sophistication

In the absence of a recognised and validated information technology sophistication construct based on a seven-point Likert scale, a construct was developed that was based on the original and widely accepted IT sophistication model developed by Raymond and Paré (1992). The information technology sophistication construct displayed a high level of internal consistency, with a Cronbach alpha score of 0.834. It would therefore be acceptable to summate the scale scores for the construct (Zikmund et al., 2012). The frequency distribution for the information technology sophistication results is depicted in Figure 17 below.

Figure 17:   Frequency distribution for information technology sophistication
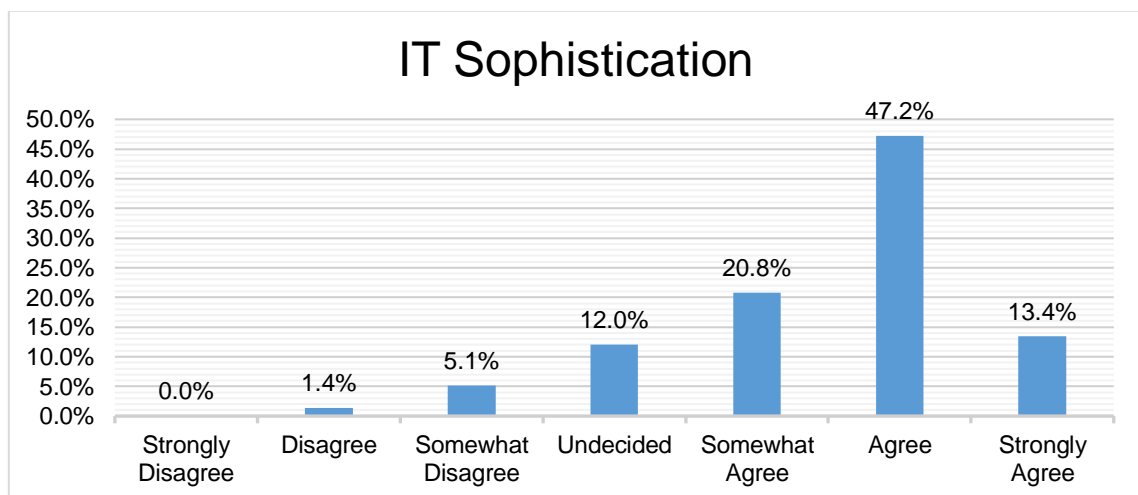
An indication of IT sophistication is the degree and concentration of the implementation and integration of a wide array components, processes and business functions (Wang

et al., 2004). A total of 81.48% of the respondents indicated that their organisations displayed high degrees of IT sophistication, whilst 17.10% of the respondents remained neutral.

5.2.3. Job design

The job design construct was developed and validated by Morgeson and Humphrey (2006) and aims to provide more detail on the levels of job autonomy, meaningfulness, and task identity, variety and feedback that the knowledge worker experiences in the working environment (Chiaburu et al., 2014; Morgeson & Humphrey, 2006). A well-designed job would be characterised by a positive psychological contribution to the knowledge worker (Banai & Reisel, 2007). Higher levels of perceived job design would be associated with lower levels of perceived work alienation. The job design construct displayed a good internal consistency, with a Cronbach alpha value of 0.725 (Zikmund et al., 2012). The job design scale scores could therefore be summated.

Based on the results displayed in Figure 18 below, there were no respondents who indicated that they experienced a negative job design impact. A total of 187 (86.57%) of the respondents indicated a positive job design experience, whilst 29 (13.40%) of the respondents remained neutral.

Figure 18:   Frequency distribution for job design
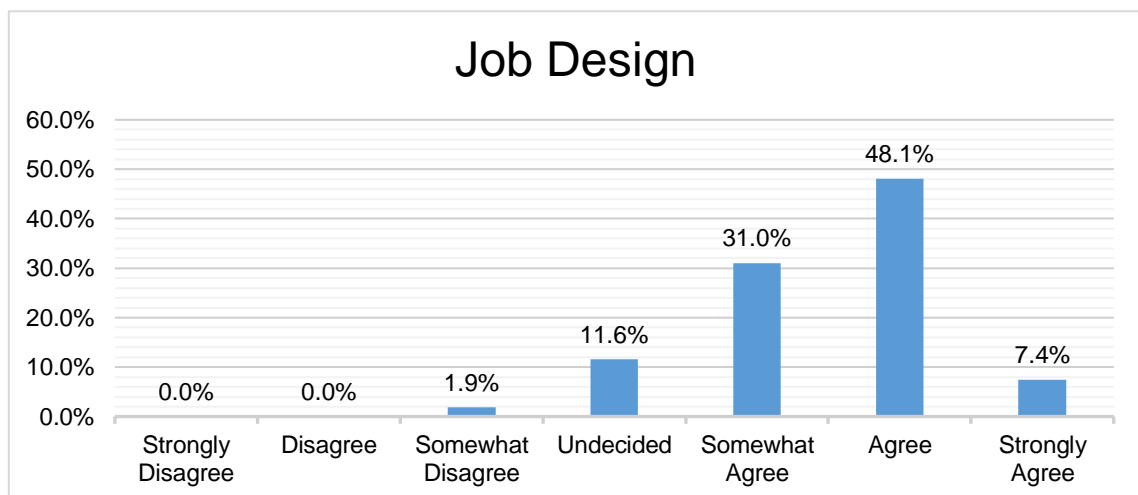
5.2.4. Knowledge Characteristics

According to Brinkley (2006), knowledge workers should perform regular activities that require complex communication skills and expert thinking, where they are predominantly assisted by computer technologies. The knowledge characteristics construct was measured with the five-item, seven-point Likert scale that was developed and validated by Morgeson and Humphrey (2006). The construct provided more insight into the nature of the respondent's work, therefore the degree to which knowledge characteristics are

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related to the job. The construct's internal consistency was good, with a Cronbach alpha score of 0.821 (Zikmund et al., 2012). It would be acceptable to summate the scale scores for the construct. Higher levels of knowledge characteristics would indicate higher levels of knowledge worker-related work.

Based on the figures depicted in Figure 19 below, a total of 87.04% of the sample indicated that they regularly perform activities that require specialised knowledge, complex communication skills and expert thinking (Brinkley, 2006; Sutherland & Jordaan, 2004). Twenty-five (11.60%) respondents were neutral, whilst three respondents indicated that their job activities did not involve complex knowledge requirements.

Figure 19: Frequency distribution for knowledge characteristics
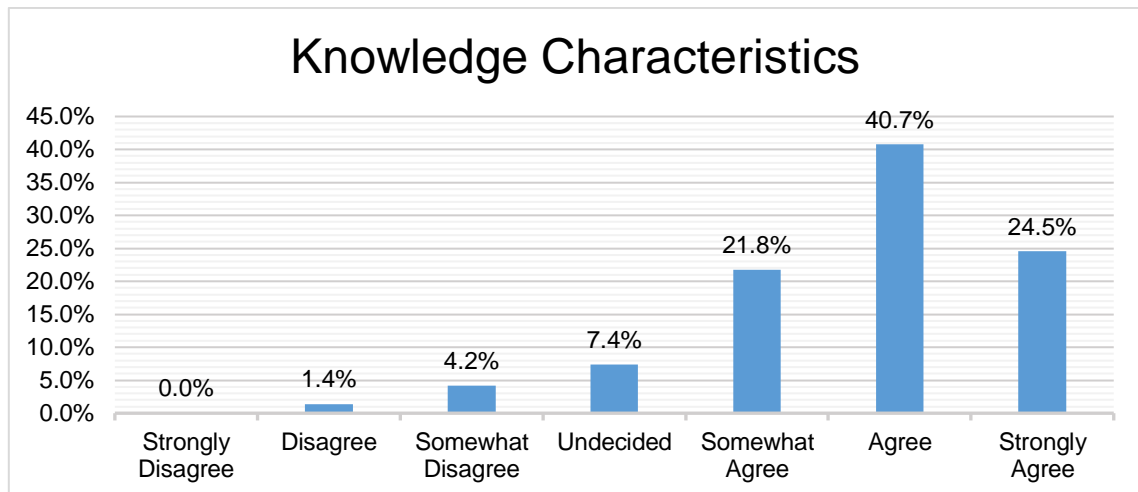
5.2.5. Work alienation

The work alienation construct provided an indication of the degree of work alienation experienced by each respondent. Work alienation was measured with the eight-item, seven-point Likert scale that was developed and validated by Nair and Vohra (2009). The construct's internal consistency was very good, with a Cronbach alpha score of 0.937. Nair and Vohra (2009) recommended that the scores for the eight work alienation variables could be summated in order to provide an overall indication of the perceived work alienation experienced by the knowledge worker. A higher score would indicate higher levels of work alienation experienced by the respondent.

Shantz et al. (2015) used a three-category approach to simplify reporting on perceived work alienation results. Based on this three-category approach, only 30 (13.89%) of the sample indicated that they experienced work alienation, with average scores ranging between 5 and 7 on the seven-point Likert scale. A total of 59 (27.31%) respondents

were neutral with scores between 3 and 4.99, whilst 127 (58.80%) of the sample were not alienated from work, as depicted in Figure 20.

Figure 20: Frequency distribution for work alienation
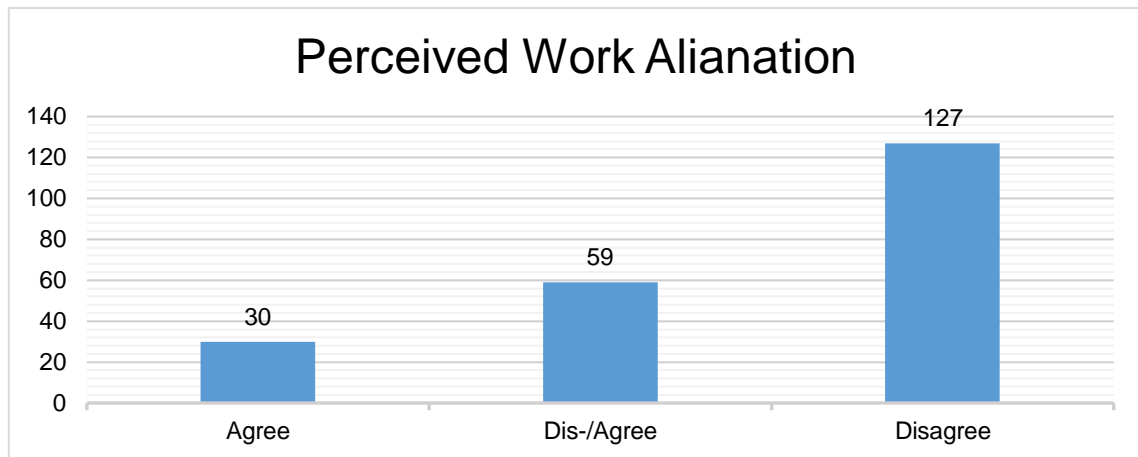
5.2.6. Demographic influences on perceived work alienation

The influence of demographics on the perceived work alienation experienced by the knowledge worker was measured by performing a Kruskal-Wallis test, which is the non-parametric test that allows a categorical independent demographic variable with three or more categories to be tested against the dependent variable work alienation (Pallant, 2010), controlling for each demographic variable. The results per demographic variable are indicated in Table 8 below. Results where the tests indicated significant differences were highlighted and indicated in bold font.

Table 8: Demographic influences on perceived work alienation

Construct	χ2	df	p	n	Min Mean Rank	Max Mean Rank
Age	3.753	3	0.289	216	98.72	115.38
Gender	0.001	1	0.971	216	108.34	108.64
Ethnicity	3.263	4	0.515	216	96.83	124.44
Education	5.477	4	0.242	216	99.00	127.94
Tenure	***11.512**	**4**	**0.021**	**216**	**89.09**	**125.62**
Appointment Level	11.742	6	0.068	216	58.75	143.70

* Correlation was significant at the 0.05 level (2-tailed).   ** Correlation was significant at the 0.01 level (2-tailed).

Tenure proved to be the only demographic variable where the Kruskal-Wallis test revealed a statistically significant difference in work alienation levels experienced across the five different tenure groups, with $p < 0.05$ (Pallant, 2010). The 11 to 15 Years group

recorded the highest work alienation scores with a Mean Rank value of 125.62, whilst the lowest work alienation scores were recorded by the tenure group 16 Years or more.

None of the remaining demographic variables displayed a statistically significant difference in work alienation levels experienced across the variable groups. However, even though the Kruskal-Wallis test for Appointment Level revealed no statistically significant difference in work alienation levels experienced across the eight different appointment level groups, with $p = 0.068$ the value was relatively close to the 0.05 significance level. The Junior group recorded the highest work alienation scores with a Mean Rank value of 143.70, followed by the Senior group with a Mean Rank value of 115.70. The lowest work alienation scores were recorded by the Assistant group, followed by the Executive group.

More details regarding the Kruskal-Wallis tests for this section are available in Appendix B: Statistical analysis details

5.3. Research Question 1

Research Question 1: Does information technology sophistication moderate the relationship between the perceived working environment and the perceived work alienation experienced by knowledge workers?

First, the relationship between the working environment sub-constructs and the perceived work alienation construct was analysed, followed by an analysis to test the possibility that information technology sophistication would moderate the relationship between the working environment and work alienation constructs.

5.3.1. Relationship between working environment and work alienation

The relationship between the work environment sub-construct variables (as measured by the Working Environment scale) and the average work alienation score (as measured by the Work Alienation scale) was investigated employing Spearman's rank-order correlation analysis (Pallant, 2010). Preliminary analyses were performed to ensure that no violation of the assumptions of normality, linearity and homoscedasticity occurred. The results for the Spearman's rank-order correlation analysis are displayed in the table below, with the statistically significant correlations indicated in bold font.

Table 9:   **Relationship between working environment and work alienation**

Construct Variable	Correlation Coefficient	Coefficient of Determination	Sig. (2-tailed)
WE1.1 The organisation has a hierarchy of authority, responsible for planning and decision making (Centralisation)	***-0.148**	**2.190%**	**0.029**
WE1.2 The organisation closely monitors adherence to the rules, policies and procedures (Formalisation)	-0.129	1.664%	0.059
WE1.3 The job is governed by a complex set of rules, policies and procedures (Bureaucracy)	-0.013	0.017%	0.850
WE2.1 The job allows me to participate in decisions that will affect the organisation as a whole (Organisational Support)	****0.421**	**17.724%**	**0.000**

* Correlation was significant at the 0.05 level (2-tailed).   ** Correlation was significant at the 0.01 level (2-tailed).

There was a significant medium, positive correlation (Cohen, 1988) for the WE2.1 organisational support variable and perceived work alienation, $r = 0.421$, with $n = 216$, $p < 0.01$. The variable helped to explain nearly 18.00% of the variance in respondents' scores on the work alienation scale, as demonstrated by the coefficient of determination. Results for the WE2 sub-construct were reversed to maintain the rationale that high levels of the perceived working environment would result in high levels of perceived work alienation. The abovementioned results indicated that higher levels of perceived organisational support would be associated with lower levels of perceived work alienation.

Unexpectedly, the results for all the WE1 sub-construct variables displayed a negative correlation with perceived work alienation. High levels of perceived centralisation, formalisation and bureaucracy would therefore result in lower levels of perceived work alienation. There was a significant, but small, negative correlation (Cohen, 1988) for the WE1.1 centralisation variable and perceived work alienation, $r = -0.148$, with $n = 216$, $p < 0.05$. The variable helped to explain approximately 2.20% of the variance in respondents' scores on the work alienation scale. The correlations between the formalisation and bureaucracy variables with the work alienation construct were not of any statistical significance.

Subsequently, the relationship between each work environment sub-construct variable (as measured by the Working Environment scale) and the perceived work alienation variables (as measured by the Work Alienation scale) was investigated employing Spearman's rank-order correlation (Pallant, 2010). Preliminary analyses were performed to ensure that no violation of the assumptions of normality, linearity and homoscedasticity occurred. The results for the Spearman's rank-order correlation analyses are displayed in Table 10 below, with the statistically significant correlations indicated in bold font and the highest correlation coefficients for each variable combination highlighted.

Table 10:   **Spearman's rho correlations between the individual working environment and work alienation variables**

Work Alienation Construct Variable (Dependent Variable)	Working Environment Construct Variable (Independent Variable)							
	WE1.1 The organisation has a hierarchy of authority, responsible for planning and decision making (Centralisation)		WE1.2 The organisation closely monitors adherence to the rules, policies and procedures (Formalisation)		WE1.3 The job is governed by a complex set of rules, policies and procedures (Bureaucracy)		WE2.1 The job allows me to participate in decisions that will affect the organisation as a whole (Organisational Support)	
	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)
WA.1 I do not enjoy my work	*-0.152	0.025	**-0.269	0.000	0.002	0.972	**0.353	0.000
WA.2 Facing my daily tasks is a painful and boring experience	*-0.160	0.019	**-0.340	0.000	-0.031	0.652	**0.452	0.000
WA.3 Work to me is more like a chore or a burden	-0.102	0.135	**-0.331	0.000	-0.045	0.509	**0.321	0.000
WA.4 I feel estranged / disconnected from myself	**-0.240	0.000	-0.107	0.117	0.001	0.987	**0.354	0.000
WA.5 I often wish I were doing something else	*-0.153	0.023	*-.0.143	0.035	-0.057	0.401	**0.357	0.000
WA.6 Over the years, I have become disillusioned about my work	-0.122	0.073	*-0.152	0.025	-0.043	0.526	**0.359	0.000
WA.7 I do not feel like putting in my best effort at work	-0.123	0.072	**-0.198	0.003	*-0.144	0.034	**0.413	0.000
WA.8 I do not feel connected to the events in my workplace	-0.124	0.068	-0.104	0.126	*-0.152	0.025	**0.419	0.000

* Correlation was significant at the 0.05 level (2-tailed).   ** Correlation was significant at the 0.01 level (2-tailed).

The high-level results for the Spearman's rank-order correlation analysis displayed the same trends as the analysis performed for the aggregated work alienation score, with significant medium, positive correlations (Cohen, 1988) occurring for the WE2.1 organisational support variable and all the work alienation variables. Correlation coefficient (r) values ranged between 0.321 and 0.452, with n = 216, p < 0.01. The correlation between the *WE2.1 organisational support* variable and the *WA.2 Facing my daily tasks is a painful and boring experience* variable helped to explain nearly 20.50% of the variance in respondents' scores for the work alienation variable, based on the coefficient of determination value of 20.430%.

Significant small to medium negative correlations (Cohen, 1988) were noted for approximately half of the WE1 variables and the work alienation variables. High levels of perceived centralisation, formalisation and bureaucracy would therefore result in lower levels of perceived work alienation.

5.3.2. Moderating role of information technology sophistication

A partial correlation analysis was used to analyse the relationship between the variables of the two working environment sub-constructs (as measured by the Working Environment scale) and perceived work alienation (as measured by the Work Alienation scale), while controlling for the scores on the Information Technology Sophistication scale (Pallant, 2010). Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity occurred. The partial correlation analysis results are displayed in Table 11 below, with the statistically significant correlations indicated in bold font.

Table 11:   Moderating role of information technology sophistication

Construct Variable	Correlation (zero order)	Correlation	Sig. (2-tailed)
WE1.1 The organisation has a hierarchy of authority, responsible for planning and decision making (Centralisation)	****-0.185**	***-0.146**	**0.032**
WE1.2 The organisation closely monitors adherence to the rules, policies and procedures (Formalisation)	-0.168	-0.051	0.459
WE1.3 The job is governed by a complex set of rules, policies and procedures (Bureaucracy)	-0.008	0.054	0.430
WE2.1 The job allows me to participate in decisions that will affect the organisation as a whole (Organisational Support)	****0.425**	****0.380**	**0.000**

* Correlation was significant at the 0.05 level (2-tailed).   ** Correlation was significant at the 0.01 level (2-tailed).

The results for the partial correlation analysis revealed a statistically significant, but small, negative partial correlation (Cohen, 1988) between WE1.1 centralisation and perceived work alienation, controlling for information technology sophistication, $r = -0.146$, $n = 214$, $p < 0.05$, with higher levels of perceived work environment centralisation being associated with lower levels of perceived work alienation. An inspection of the zero-order correlation ($r = -0.185$) suggested that controlling for information technology sophistication reduced the strength of the relationship between these two variables by 21.10%.

The only other statistically significant partial correlation was a medium, positive partial correlation (Cohen, 1988) between the WE2.1 organisational support variable and perceived work alienation, controlling for information technology sophistication, $r = 0.380$, $n = 213$, $p < 0.01$, with high levels of perceived organisational support associated with low levels of perceived work alienation. An inspection of the zero-order correlation ($r =$

0.425) suggested that controlling for information technology sophistication reduced the strength of the relationship between these two variables by 10.56%.

Results for the partial correlation analyses for the WE1.2 formalisation and WE1.3 bureaucracy variables were both small and negative, but not of statistical significance. More details regarding the partial correlations analyses for this section are available in Appendix B: Statistical analysis details.

5.3.3. Research Question 1 Conclusion

Two Spearman's rank-order correlation tests were performed to test whether the perceived working environment would impact the perceived work alienation experienced by knowledge workers. The results for the Spearman's rank-order correlation analyses indicated a significant medium, positive correlation for the organisational support variable and perceived work alienation. The variable helped to explain nearly 18.00% of the variance in respondents' scores on the work alienation scale, confirming that high levels of perceived organisational support would be associated with low levels of perceived work alienation.

The results for all the centralisation, formalisation and bureaucracy variables, however, displayed a negative correlation with perceived work alienation. There was a significant, but small, negative correlation for the centralisation variable and perceived work alienation. Higher levels of perceived working environment centralisation would therefore result in lower levels of perceived work alienation. The variable helped to explain approximately 2.20% of the variance in respondents' scores on the work alienation scale. The correlations between the working environment formalisation and bureaucracy variables with the work alienation construct were not of any statistical significance.

It could therefore be confirmed that the perceived working environment did impact the perceived work alienation, experienced by knowledge workers.

A partial correlation analysis was employed to test whether information technology sophistication would moderate the relationship between the perceived working environment and the perceived work alienation experienced by knowledge workers.

The results revealed a statistically significant, but small, negative partial correlation between centralisation and perceived work alienation. Controlling for information technology sophistication reduced the strength of the relationship between the two variables by 21.10%. A statistically significant medium, positive partial correlation was noted between the organisational support variable and perceived work alienation.

Controlling for information technology sophistication reduced the strength of the relationship between the two variables by 10.56%.

Research Question 1 could therefore be confirmed that information technology sophistication did in fact moderate the relationship between the perceived working environment and the perceived work alienation, experienced by knowledge workers.

5.4. Research Question 2

Research Question 2: Does information technology sophistication moderate the relationship between the perceived job design and the perceived work alienation, experienced by knowledge workers?

The relationship between the job design and the perceived work alienation constructs was initially analysed, followed by an analysis to test the possibility that information technology sophistication would moderate the relationship between the job design and work alienation constructs.

5.4.1. Relationship between job design and work alienation

The relationship between the job design construct (as measured by the Job Design scale) and the work alienation construct (as measured by the Work Alienation Scale) was investigated using Spearman's rank-order correlation analysis (Pallant, 2010). Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity occurred.

The scatterplot diagram in Figure 21 indicated that the relationship between the job design and work alienation constructs showed a distinctly negative relationship.

There was a large, negative correlation (Cohen, 1988) between the two constructs, $r = -0.509$, $n = 216$, $p < 0.01$. The correlation was significant at the 0.01 level (2-tailed), and the Coefficient of Determination was 25.908%.

Figure 21: Scatterplot diagram
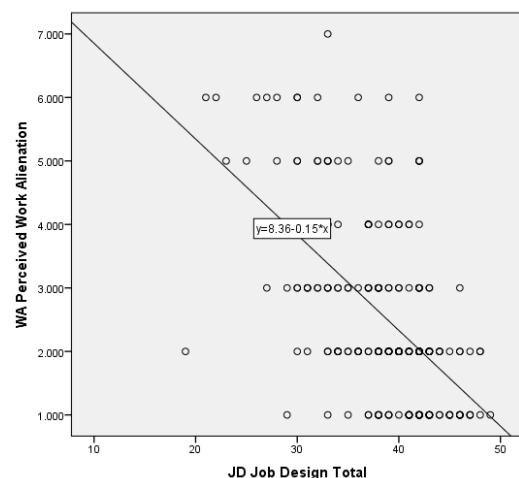
The results indicated that high levels of perceived job design would be associated with low levels of perceived work alienation. The variable helped to explain nearly 26.00% of the variance in respondents' scores on the work alienation scale.

The relationship between the job design construct variables (as measured by the Job Design scale) and perceived work alienation variables (as measured by the Work Alienation scale) was then investigated, again using Spearman's rank-order correlation analysis (Pallant, 2010). Preliminary analyses were performed to ensure that no violation of the assumptions of normality, linearity and homoscedasticity occurred.

The results for the Spearman's rank-order correlation analyses are displayed in Table 12 below, with the statistically significant correlations indicated in bold font and the highest correlation coefficients for each variable combination highlighted.

Table 12: **Spearman's rho correlations between the individual job design and work alienation variables**

Work Alienation Construct Variable (Dependent Variable)	JD.1 The job allows me to plan how I do my work		JD.2 The job allows me to make a lot of decisions on my own		JD.3 The job allows me to decide on my own how to go about doing my work		JD.4 The job requires the performance of a wide range of tasks		JD.5 The work activities themselves provide direct and clear information about the effectiveness of my job performance		JD.6 The results of my work are likely to significantly affect the lives of other people		JD.7 The job involves completing a piece of work that has an obvious beginning and end	
	Correlation	Sig. (2-tailed)	Correlation	Sig. (2-tailed)	Correlation	Sig. (2-tailed)	Correlation	Sig. (2-tailed)	Correlation	Sig. (2-tailed)	Correlation	Sig. (2-tailed)	Correlation	Sig. (2-tailed)
WA.1 I do not enjoy my work	**-0.369**	0.000	**-0.310**	0.000	**-0.346**	0.000	**-0.208**	0.002	**-0.337**	0.000	**-0.258**	0.000	*-0.139	0.042
WA.2 Facing my daily tasks is a painful and boring experience	**-0.466**	0.000	**-0.332**	0.000	**-0.411**	0.000	**-0.235**	0.000	**-0.395**	0.000	**-0.335**	0.000	**-0.252**	0.000
WA.3 Work to me is more like a chore or a burden	**-0.391**	0.000	**-0.297**	0.000	**-0.417**	0.000	**-0.242**	0.000	**-0.365**	0.000	**-0.350**	0.000	**-0.240**	0.000
WA.4 I feel estranged / disconnected from myself	**-0.349**	0.000	**-0.348**	0.000	**-0.381**	0.000	**-0.232**	0.000	**-0.417**	0.000	**-0.259**	0.000	**-0.295**	0.000
WA.5 I often wish I were doing something else	**-0.366**	0.000	**-0.326**	0.000	**-0.377**	0.000	-0.119	0.082	**-0.356**	0.000	**-0.280**	0.000	**-0.272**	0.000
WA.6 Over the years, I have become disillusioned about my work	**-0.365**	0.000	**-0.353**	0.000	**-0.387**	0.000	**-0.186**	0.006	**-0.403**	0.000	**-0.309**	0.000	**-0.336**	0.000
WA.7 I do not feel like putting in my best effort at work	**-0.339**	0.000	**-0.304**	0.000	**-0.379**	0.000	**-0.277**	0.000	**-0.384**	0.000	**-0.265**	0.000	**-0.188**	0.005
WA.8 I do not feel connected to the events in my workplace	**-0.385**	0.000	**-0.336**	0.000	**-0.385**	0.000	**-0.196**	0.004	**-0.468**	0.000	**-0.244**	0.000	**-0.314**	0.000

* Correlation was significant at the 0.05 level (2-tailed). ** Correlation was significant at the 0.01 level (2-tailed).

The results for the Spearman's rank-order correlation analyses are displayed in Table YYY below, with the statistically significant correlations indicated in bold font and the highest correlation coefficients for each variable combination highlighted.

The large, negative correlation (Cohen, 1988) between the two constructs was reflected by the predominantly significant correlations between the construct variables. Correlation coefficient (r) values ranged between -0.139, with n = 216, $p < 0.05$, to r = -0.468, with n = 216, $p < 0.01$.

The results confirmed that high levels of perceived job design would be associated with low levels of perceived work alienation. The variable helped to explain nearly 26.00% of the variance in respondents' scores on the work alienation scale. The correlation between the *JD.5 The work activities themselves provide direct and clear information about the effectiveness of my job performance* variable and the *WA.8 I do not feel connected to the events in my workplace* variable helped to explain nearly 22.00% of the variance in respondents' scores on the work alienation scale, based on the coefficient of determination value of 21.904%.

5.4.2. Moderating role of information technology sophistication

A partial correlation analysis was used to investigate the relationship between the job design variables (as measured by the Job Design scale) and perceived work alienation (as measured by the Work Alienation scale), while controlling for the scores on the Information Technology Sophistication scale (Pallant, 2010). Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity occurred. The partial correlation analysis results are displayed in Table 13 below, with the statistically significant correlations indicated in bold font.

Table 13:   Moderating role of information technology sophistication

Construct Variable	Correlation (zero order)	Correlation	Sig. (2-tailed)
JD.1 The job allows me to plan how I do my work	**-0.389	**-0.322	0.000
JD.2 The job allows me to make a lot of decisions on my own	**-0.366	**-0.309	0.000
JD.3 The job allows me to decide on my own how to go about doing my work	**-0.364	**-0.332	0.000
JD.4 The job requires the performance of a wide range of tasks	**-0.251	**-0.196	0.004
JD.5 The work activities themselves provide direct and clear information about the effectiveness of my job performance	**-0.435	**-0.361	0.000
JD.6 The results of my work are likely to significantly affect the lives of other people	**-0.346	**-0.305	0.000
JD.7 The job involves completing a piece of work that has an obvious beginning and end	**-0.288	**-0.224	0.001

* Correlation was significant at the 0.05 level (2-tailed).   ** Correlation was significant at the 0.01 level (2-tailed).

The results for the partial correlation analysis revealed a statistically significant, small to medium, negative partial correlation (Cohen, 1988) between perceived work alienation and job design, controlling for information technology sophistication. Details for the

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largest correlation are r = -0.361, n = 214, p < 0.01, with higher levels of perceived job design associated with lower levels of perceived work alienation. A review of the zero-order correlation (r = -0.435) suggested that controlling for information technology sophistication resulted in a 17.011% reduction on the strength of the relationship between these two variables, and therefore on the knowledge worker's perceived work alienation. This finding proposed that the observed relationship between perceived work alienation and perceived job design is moderated by information technology sophistication.

More details regarding the partial correlations analysis for this section are available in Appendix B: Statistical analysis details.

5.4.3. Research Question 2 Conclusion

Spearman's rank-order correlation tests were performed to test whether the perceived job design would impact the perceived work alienation, as experienced by knowledge workers. The results for the Spearman's rank-order correlation analyses indicated a statistically significant large, negative correlation for the job design and its variables and perceived work alienation. The construct helped to explain nearly 26.00% of the variance in respondents' scores on the work alienation scale, indicating that high levels of perceived job design would be associated with low levels of perceived work alienation.

It could therefore be confirmed that the perceived job design did impact the perceived work alienation experienced by knowledge workers.

A partial correlation analysis was employed to test whether information technology sophistication would moderate the relationship between the perceived job design and the perceived work alienation experienced by knowledge workers. The results revealed a statistically significant, small to medium, negative partial correlation between perceived work alienation and job design. Controlling for information technology sophistication reduced the strength of the relationship between the two variables by 17.011%.

Research Question 2 could therefore be concluded that information technology sophistication did in fact moderate the relationship between the perceived working environment and the perceived work alienation experienced by knowledge workers.

5.5. Research Question 3

Research Question 3: Does the information technology sophistication impact the perceived work alienation experienced by knowledge workers?

The research question aimed to establish whether information technology sophistication impacted the perceived work alienation experienced by knowledge workers working in contemporary financial services institutions.

5.5.1. Relationship between IT sophistication and work alienation

The relationship between information technology sophistication (as measured by the Information Technology Sophistication scale) and perceived work alienation (as measured by the Work Alienation Scale) was investigated using Spearman's rank-order correlation (Pallant, 2010). Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity.

The scatterplot diagram in Figure 22 showed a negative, linear relationship between the data points. Spearman's rank order correlation test revealed a small, but still significant, negative correlation between the two constructs, $r = -0.292$, $n = 216$, $p = 0.000$, at the 0.01 level (2-tailed). A variance of 8.526% in respondents' scores on the perceived work alienation scale could be attributed to perceived information technology sophistication.

Figure 22: Scatterplot diagram
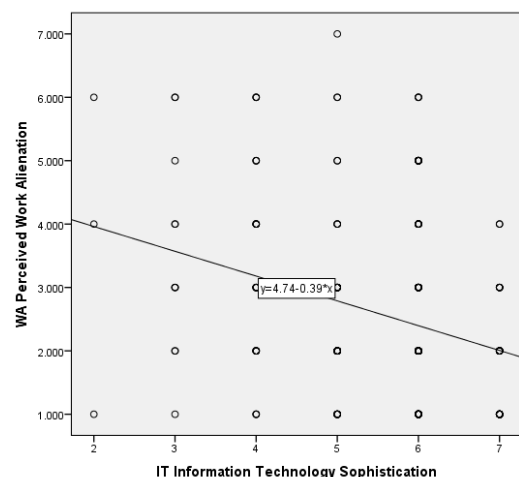
Generally, higher levels of perceived information technology sophistication would therefore be associated with lower levels of perceived work alienation.

The relationships between the individual information technology sophistication variables (as measured by the Information Technology Sophistication scale) and the perceived work alienation variables (as measured by the Work Alienation Scale) were also investigated using Spearman's rank-order correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity (Pallant, 2010).

The results for the Spearman's rank-order correlation analyses are displayed in Table 14 below, with the statistically significant correlations indicated in bold font and the highest correlation coefficients for each variable combination highlighted.

Table 14:   Spearman's rho correlations between the individual information technology sophistication and work alienation variables

Work Alienation Construct Variable (Dependent Variable)	Information Technology Sophistication Construct Variable (Independent Variable)													
	IT.1 The organisation uses a wide variety of sophisticated hardware, software, programming languages and data processing capabilities		IT.2 The organisation uses a wide variety of transactional and administrative software systems, with high levels of integration and communication between the systems		IT.3 The organisation has a dedicated IT department, through which mature IT processes are implemented by a variety of IT specialists		IT.4 IT in the organisation is managed through mature processes that cover all management aspects, including strategy execution, funding and governance, to name but a few		IT.5 Many processes in my job environment are computerised		IT.6 Adherence to rules, policies and procedures applicable to my job are closely monitored by computerised systems		IT.7 My job requires me to exchange a lot of information with computer systems	
	Correlation	Sig. (2-tailed)	Correlation	Sig. (2-tailed)	Correlation	Sig. (2-tailed)	Correlation	Sig. (2-tailed)	Correlation	Sig. (2-tailed)	Correlation	Sig. (2-tailed)	Correlation	Sig. (2-tailed)
WA.1 I do not enjoy my work	**-0.197	0.004	**-0.182	0.007	**-0.256	0.000	**-0.182	0.007	**-0.248	0.000	**-0.248	0.000	-0.127	0.063
WA.2 Facing my daily tasks is a painful and boring experience	**-0.234	0.001	*-0.139	0.041	**-0.282	0.000	**-0.229	0.001	**-0.216	0.001	**-0.201	0.003	-0.112	0.102
WA.3 Work to me is more like a chore or a burden	**-0.224	0.001	*-0.148	0.030	**-0.249	0.000	**-0.220	0.001	**-0.218	0.001	**-0.203	0.003	-0.101	0.138
WA.4 I feel estranged / disconnected from myself	**-0.201	0.001	**-0.181	0.008	**-0.232	0.001	**-0.258	0.003	**-0.205	0.003	**-0.180	0.008	-0.109	0.111
WA.5 I often wish I were doing something else	**-0.202	0.003	-0.107	0.118	*-0.165	0.015	-0.128	0.061	*-0.137	0.044	**-0.185	0.006	-0.037	0.593
WA.6 Over the years, I have become disillusioned about my work	**-0.185	0.007	-0.133	0.051	*-0.172	0.011	*-0.160	0.019	*-0.169	0.013	**-0.198	0.003	-0.122	0.073
WA.7 I do not feel like putting in my best effort at work	**-0.236	0.000	*-0.140	0.040	**-0.257	0.000	**-0.198	0.004	**-0.266	0.000	**-0.190	0.005	-0.119	0.080
WA.8 I do not feel connected to the events in my workplace	*-0.144	0.035	**-0.188	0.006	**-0.241	0.000	**-0.201	0.003	**-0.259	0.000	**-0.263	0.000	*-0.174	0.011

* Correlation was significant at the 0.05 level (2-tailed).

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

The significant, but small, negative correlation (Cohen, 1988) between the two constructs was reflected by the predominantly significant correlations between the construct variables. Correlation coefficient (r) values ranged between -0.137, with n = 216, p < 0.05, to r = -0.282, with n = 216, p < 0.01. The variable *IT.3 The organisation has a dedicated IT department, through which mature IT processes are implemented by a variety of IT specialists* had the biggest correlation value of r = -0.282. The coefficient of determination for the variable indicated that the variable helped to explain the biggest contribution of the variance in respondents' scores on the perceived work alienation scale, namely 7.95%. The overall results indicated that higher levels of perceived information technology sophistication would therefore be associated with lower levels of perceived work alienation.

5.5.2. IT sophistication's unique contribution to perceived work alienation

Standard multiple regression was subsequently performed to assess the ability of the work environment (measured by the Work Environment Scale), job design (measured by the Job Design Scale) and information technology sophistication (measured by the Information Technology Sophistication scale) constructs to predict levels of perceived work alienation (measured by the Work Alienation Scale), after controlling for the influence of information technology sophistication (Pallant, 2010). Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity.

The results of the regression indicated that the independent variables collectively explained 31.00% of the variance in perceived work alienation ($R^2=0.310$, $F_{(6,209)} = 15.636$, $p<0.0001$). The Adjusted $R^2 = 0.290$. More detailed results follow in Table 15 below.

Table 15:   Results for standard multiple regression analysis

Construct Variable	Standardised Coefficients Beta (β)	p	Part Correlation	Squared Part Correlation
WE1.1 The organisation has a hierarchy of authority, responsible for planning and decision making (Centralisation)	-0.071	0.231	-0.069	0.476%
WE1.2 The organisation closely monitors adherence to the rules, policies and procedures (Formalisation)	-0.002	0.977	-0.002	0.000%
WE1.3 The job is governed by a complex set of rules, policies and procedures (Bureaucracy)	0.065	0.305	0.059	0.348%
WE2.1 The job allows me to participate in decisions that will affect the organisation as a whole (Organisational Support)	**0.217	0.002	0.182	3.312%
JD Job Design (summated)	**-0.351	0.000	-0.276	7.618%
IT Information Technology Sophistication (Summated)	-0.088	0.202	-0.074	0.548%

* Correlation was significant at the 0.05 level (2-tailed).   ** Correlation was significant at the 0.01 level (2-tailed).

The contribution made by information technology sophistication to the prediction of the perceived work alienation was the weakest contribution made by all the variables and was not considered to be a statistically significant unique contribution (β = -0.088, $p<0.202$). This test was performed when the variance explained by all the other variables in the model was controlled for (Pallant, 2010). The squared part correlation co-efficient value of -0.074 was 0.548%. Therefore, information technology sophistication only uniquely described approximately 0.5% of the variance in the perceived work alienation scores (Tabachnick & Fidell, 2007).

However, both the WE2.1 organisational support (β = 0.217, $p<0.01$) and the job design (β = -0.351, $p<0.01$) variables made a significant unique contribution to explaining the dependent variable, work alienation (Pallant, 2010). The squared part correlation co-efficient value for the WE2.1 organisational support variable of 0.182 was 3.312%. The variable therefore, uniquely described approximately 3% of the variance in the perceived work alienation scores (Tabachnick & Fidell, 2007). The squared part correlation co-efficient value for the job design variable of -0.276 was 7.618%. According to Tabachnick and Fidell (2007) the variable uniquely described nearly 8% of the variance in the perceived work alienation scores. The part correlation co-efficient values mentioned above only represent the unique contributions that each variable made to the total variance in perceived work alienation. Shared variance or areas of overlap were removed or limited (Pallant, 2010).

None of the other construct variables made a statistically significant unique contribution to the prediction of the perceived work alienation.

More details regarding the partial correlations analysis for this section are available in Appendix B: Statistical analysis details.

5.5.3. Research Question 3 Conclusion

The relationship between information technology sophistication and perceived work alienation was investigated using Spearman's rank-order correlation analyses. The analyses revealed a small, but still significant, negative correlation between the two constructs, with a variance of 8.526% in respondents' scores on the perceived work alienation scale that could be attributed to perceived information technology sophistication. Higher levels of perceived information technology sophistication would therefore be associated with lower levels of perceived work alienation.

A standard multiple regression test was also performed to assess the ability of the work environment, job design and information technology sophistication constructs to predict levels of perceived work alienation, after controlling for the influence of information

technology sophistication. Information technology sophistication only uniquely described approximately 0.5% of the variance in the perceived work alienation scores, which was considered to be insignificant.

Research Question 3 could therefore be confirmed that the perceived information technology sophistication did impact the perceived work alienation experienced by knowledge workers.

5.6. Conclusion

This research study confirmed that information technology sophistication does impact perceived work alienation experienced by knowledge workers working in contemporary financial services institutions.

6. Chapter Six: Discussion of research results

6.1. Introduction

A wide variety of modern organisations, including financial services institutions, are faced with the challenge to reverse their unsatisfactory performance or even to secure targeted strategic strong holdings. However, in order to do so, they will have to master the fine balance between retaining and empowering their knowledge workers, whilst at the same time further develop their IT sophistication. It is therefore imperative to understand what the role and inter-relationships would be between the knowledge workers and how they perceive their working environments, and the changing conditions in the working environments and job characteristics.

In this chapter the results from the statistical analyses detailed in Chapter 5 are discussed, with particular reference to how they relate to the research questions presented in Chapter 3 and the supporting literature reviewed in Chapter 2.

6.2. Sample demographics

Five hundred knowledge workers involved in eight major financial services institutions in Johannesburg in South Africa were invited to participate in the research study. The sample constituted the responses from the 216 participants who successfully completed the online questionnaire in full.

Contrary to the male-dominated nature of previous knowledge worker alienation studies where predominantly young male knowledge workers were involved (Nair & Vohra, 2010), the study reflected a more balanced gender profile, which is aligned to research studies in the financial services institutions in South Africa (João & Coetzee, 2012; Reddy & Govender, 2014). The sample contained roughly equal numbers of male (53.70%) and female (46.30%) respondents.

The majority of the respondents (50.46%) were in the age group 30 to 44 years, followed by the 45 to 59 years (39.35%) age group. In total, 92.59% of the respondents were 30 years of age and older. This is again contrary to the widely recognised study performed by Nair and Vohra (2010) where the majority of the respondents were young male participants. It also differs from the work alienation study by Çetin et al. (2009) where approximately 70% of the respondents were younger than 30 years of age across five leading financial institutions in Istanbul, Turkey.

The ethnic profile of the sample indicated that the respondents were predominantly from a White / Caucasian background (65.28%), followed by the African (14.35%) and Indian / Asian (12.04%) ethnic groups. The Coloured group represented 7.41% of the respondents, whilst only two respondents indicated that they represented the Multiple Ethnicity / Other group.

Knowledge workers are widely recognised for their ability to apply specialised knowledge (Sutherland & Jordaan, 2004), as well as the capacity to create a competitive advantage, based on their high education and skills levels (Dewhurst et al., 2013). The education profile for the sample showed that 88.43% of the respondents had an education level that was higher than a high school Grade 12 certification, confirming that the sample displayed the abovementioned knowledge worker characteristics. The figure was similar to the education profile from the research study performed by João & Coetzee (2012) on the South African financial services sector, known for its high required qualification levels. The single biggest group of 62 (28.70%) respondents indicated that they achieved a post-graduate degree, followed by 61 (28.24%) of the respondents with a tertiary diploma or equivalent education, and 40 (18.52%) of the respondents with a 3-year degree.

It was interesting to note that approximately half (47.69%) of the sample indicated that they spent only between zero to five years at the current financial services institution, compared to the majority of knowledge worker respondents who spent one to ten years at a leading financial services institution in South Africa in the study by Reddy and Govender (2014). The respondents also indicated that 58 (26.85%) had a tenure of 16 years or more at their current institution.

The Appointment profile for the respondents showed that 92.13% of the respondents were appointed in Senior to Executive positions, with the highest representation for appointment level being Managers with 107 (49.54%) respondents, followed by 52 (24.07%) Senior and 28 (12.96%) Lead appointed respondents. The study also included seven Director and five Executive position respondents. Experience levels, when related to appointment levels, differed in the Çetin et al. (2009) study, with 64.28% of the participants having less than 5 years of relevant experience. Brinkley (2006) argued that the knowledge worker should be a person who is typically included in the top three standard occupational classifications, like managers, professionals and associate professionals.

6.3. Perceived work alienation

Based on the three-category classification of the perceived work alienation results (Shantz et al., 2015) thirty respondents (13.89%) of the sample indicated that they

experienced work alienation, with average scores ranging between 5 and 7 on the seven-point Likert scale, measured by the Work Alienation scale. A total of 59 (27.31%) respondents were neutral with scores between 3 and 4.99, whilst 127 (58.80%) of the sample respondents indicated that they were not alienated from work. Figure 23 depicts the frequency distribution of the perceived work alienation.

Figure 23:   Frequency distribution of perceived work alienation
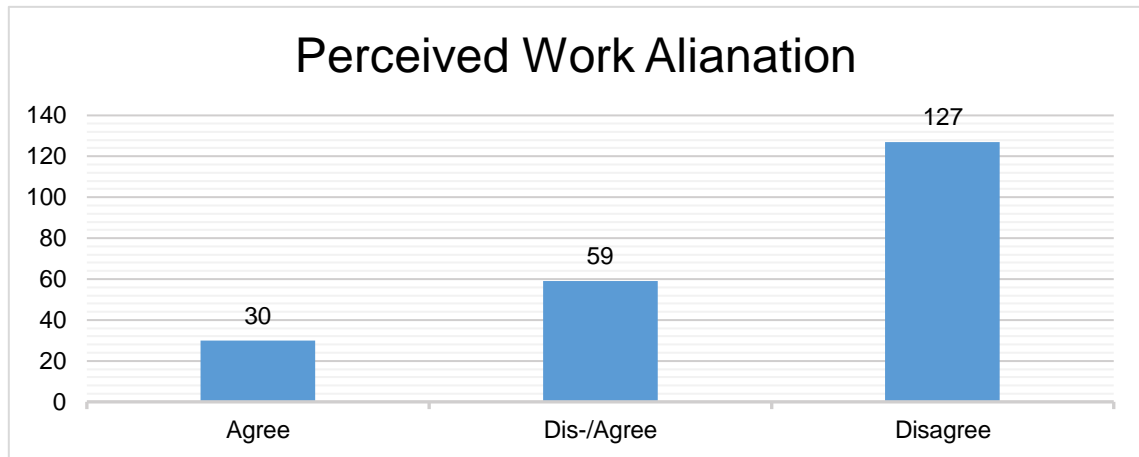
6.3.1. Perceived work alienation experienced by various demographic groups

Tenure proved to be the only demographical group where a statistically significant difference in work alienation levels was experienced across the five different tenure groups (Pallant, 2010), as indicated in Table 16 below. The 3 to 5 Years group recorded the highest perceived work alienation scores with a Mean Rank value of 122.98, closely followed by the 11 to 15 Years group with a Mean Rank of 120.66, and the 6 to 10 Year group with a Mean Rank score of 117.72. The lowest work alienation scores were recorded by the tenure group 16 Years or more.

Table 16:   Tenure profile for the respondents

Category	Response Number	Response Percentage	Mean Rank	Median
2 years or less	43	19.91%	101.59	2.00
3 to 5 years	60	27.78%	122.98	2.00
6 to 10 years	39	18.06%	117.72	2.00
11 to 15 years	16	7.41%	120.66	3.00
16 years and more	58	26.85%	89.09	2.00

Although the difference in perceived work alienation levels experienced by the Appointment Level group was just above the $p < 0.05$ significance level, it is still noteworthy to point out that the Appointment Level groups recorded differences in work

alienation levels that were very close to being statistically significant. The Junior group recorded the highest work alienation scores with a Mean Rank value of 143.70, followed by the Senior group with a Mean Rank value of 119.41. The lowest work alienation scores were recorded by the Assistant group, followed by the Executive group. More details are available in Table 17 below.

Table 17:   Appointment profile for the respondents

Category	Response Number	Response Percentage	Mean Rank	Median
Trainee	0	0.00%	0.00	0.00
Assistant	2	0.93%	58.75	1.50
Junior	15	6.94%	143.70	4.00
Senior	52	24.07%	119.14	2.00
Lead	28	12.96%	112.04	2.00
Manager	107	49.54%	99.83	2.00
Director	7	3.24%	109.64	2.00
Executive	5	2.31%	76.30	2.00

The perceived work alienation of approximately 20% as experienced by knowledge workers recorded by Nair and Vohra (2010) was based on a respondent group that was predominantly "males, young in age, who were junior- and middle-level" (Nair & Vohra, 2010, p. 610). The higher perceived work alienation levels indicated in the abovementioned tables in this section seemed to be similar in nature, compared to the results from Nair and Vohra (2010), where higher perceived work alienation levels were noted amongst more junior appointees who may have shorter tenures than the more senior appointees.

Davenport (2005) suggested that the growing knowledge worker representation in modern knowledge economy organisations may range between 30% and 50%. Even though the number of knowledge workers that experienced work alienation in this research study was approximately 30% lower than the perceived work alienation levels indicated by Nair and Vohra (2010), it still implies that for every 1,000 knowledge workers employed, approximately 139 will be negatively impacted due to their perceived work alienation. This is a high figure when taking into account the organisation's high dependency on the knowledge worker, as well as the fact that they are highly educated and well remunerated (Çetin et al., 2009).

6.4. Discussion of findings related to Research Question 1

Research Question 1 aimed to establish whether information technology sophistication moderated the relationship between the perceived working environment and the perceived work alienation experienced by knowledge workers.

Working environments introduce structural elements in the organisation that are represented by centralisation, formalisation, bureaucratisation, organisational support and technology factors. The working environment elements are generally accepted to contribute to the work alienation experienced by knowledge workers (Podsakoff et al., 2009).

6.4.1. Impact of working environment on perceived work alienation

The first step to verify the possible moderator role of information technology sophistication was to establish whether the working environment impacted the perceived work alienation, as experienced by the knowledge worker. Contrary to the expected outcome, the relationships between work alienation and the centralisation, formalisation and bureaucracy variables were weak, but also predominantly negative. On a construct level, only the results for the centralisation variable (-0.148) were significant, with higher levels of perceived working environment centralisation expected to result in lower levels of perceived work alienation. Centralisation is characterised by a hierarchy of authority and reduced levels of involvement and participation from the knowledge worker, which was expected to result in higher levels of work alienation (Chiaburu et al., 2014). Approximately 6.00% of the variance in respondents' scores on the work alienation scale was explained by the largest correlation; that was between the work alienation variable *WA.4 I feel estranged / disconnected from myself* and the centralisation variable. The correlations between the working environment formalisation (-0.129) and bureaucracy (-0.013) variables with the work alienation construct were also negative, but not of any statistical significance.

Results from a work alienation study by Chiaburu et al. (2014) revealed similar findings, where the relationship between the working environment formalisation (-0.050) and bureaucracy (-0.070) variables with the work alienation construct were also negative and non-significant. The result for the centralisation variable, however, was positive (0.270). Chiaburu et al. (2014) attributed these results to the contradicting roles that formalisation and bureaucracy play in an organisation. Formalisation offers business processes and procedures, standardised job requirements and governance structures that may act as benefit to the knowledge workers. On the other hand, when working environment bureaucracy is characterised by disproportionate levels of rule application and rigorous

management control, it is expected to lead to increased levels of work alienation (Atzeni, 2016).

Organisational support provides "cognitive, emotional, and physical" (Chiaburu et al., 2014, p. 27) resources to employees. The respondents experienced lower levels of work alienation with increased levels of organisational support, which corresponds with the available literature studies. There was a significant medium, positive correlation (0.421) for the organisational support variable and perceived work alienation. The variable helped to explain nearly 18.00% of the variance in respondents' scores on the work alienation scale.

Based on the data analyses, the study respondents experienced contradicting levels of perceived work alienation based on the impact of the various working environment variables. The tests did, however, confirm that the perceived working environment did impact the perceived work alienation, as experienced by knowledge workers.

6.4.2. Moderator role of information technology sophistication

A moderator is characterised by its influence on a relationship between two or more entities, where the direction and strength of the relationship between the entities may be influenced by the moderator (Baron & Kenny, 1986). The data analyses confirmed that information technology sophistication did moderate the relationship strength between the perceived working environment and the perceived work alienation that was experienced by knowledge workers.

Results revealed that when controlling for information technology sophistication, it reduced the relationship strength between work alienation and centralisation by 21.10%, formalisation by 69.90% and organisational support by 10.56%. The relationship between work alienation and bureaucracy was increased nearly six times. It must, however, be noted that only the relationships between work alienation and centralisation, as well as organisational support, were of statistical significance.

6.4.3. Summary of results for Research Question 1

Professionals and knowledge workers are believed to experience higher levels of alienation, the higher the degree of centralisation and formalisation in the working environment, according to previous studies from Aiken and Hage (1966), as cited in Chiaburu et al. (2014). Analyses results revealed, however, that the knowledge worker respondents experienced lower levels of perceived work alienation with higher levels of perceived work environment centralisation and organisational support. Results for centralisation and bureaucracy were statistically insignificant.

It was also confirmed that information technology sophistication did moderate the relationship between the perceived work alienation and the perceived working environment centralisation and organisational support variables, as depicted in Figure 24. Therefore, it could be concluded that information technology sophistication did moderate the relationship between the perceived working environment and the perceived work alienation, as experienced by knowledge workers.
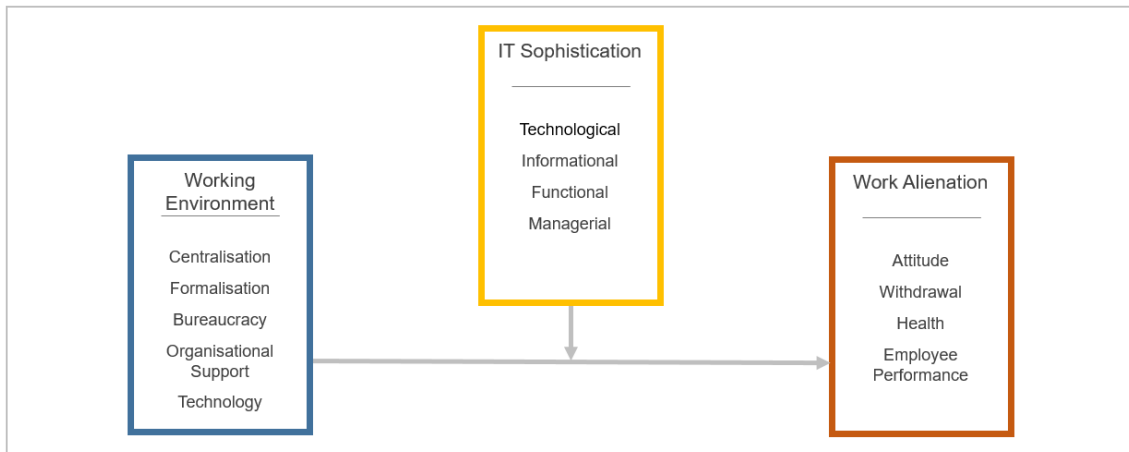
Figure 24:   Moderator role of information technology sophistication

6.5.   *Discussion of findings related to Research Question 2*

Research Question 2 aimed to establish whether information technology sophistication moderated the relationship between the perceived job design and the perceived work alienation experienced by knowledge workers.

Job autonomy, job feedback and task identify, significance and variety are the attributes that contribute to a well-designed job. Knowledge workers may have a positive experience based on the positive psychological influence in a well-designed job, which may again lead to lower perceived levels of work alienation (Banai & Reisel, 2007).

6.5.1. Impact of job design on perceived work alienation

The possible impact of job design on the perceived work alienation was first tested. Analysis results revealed a large, negative correlation of statistical significance where job design helped to explain nearly 26.00% of the variance in respondents' scores on the work alienation scale. High levels of perceived job design would therefore be associated with low levels of perceived work alienation.

Results from the 2014 work alienation study by Chiaburu et al. (2014) revealed similar findings, where the job autonomy, job feedback, task identify, task significance and task variety variables all displayed small to medium, negative correlations with work alienation

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(Chiaburu et al., 2014). Similar negative correlations were also recorded by Shantz et al. (2015) where task identity and variety produced statistically significant results. The variables were therefore weak predictors of work alienation.

It could therefore be confirmed that the perceived job design did impact the perceived work alienation, as experienced by knowledge workers.

6.5.2. Moderator role of information technology sophistication

The analyses confirmed that information technology sophistication did moderate the relationship strength, but not the direction (Baron & Kenny, 1986), between the perceived job design and the perceived work alienation, as experienced by knowledge workers. The results revealed a statistically significant, small to medium, negative partial correlation between the job design construct and perceived work alienation. Controlling for information technology sophistication reduced the strength of the relationship between the two variables by 17.011%.

6.5.3. Summary of results for Research Question 2

The research study analyses results confirmed the arguments made by Banai & Reisel (2007) that the job autonomy, job feedback, and task identify, variety and significance attributes in a well-designed job would be characterised by a positive psychological contribution. This was expected to result in lower perceived levels of work alienation experienced by the knowledge worker. The analyses also confirmed that information technology sophistication did moderate the relationship between the perceived job design and the perceived work alienation, as experienced by knowledge workers, as illustrated in Figure 25 below.
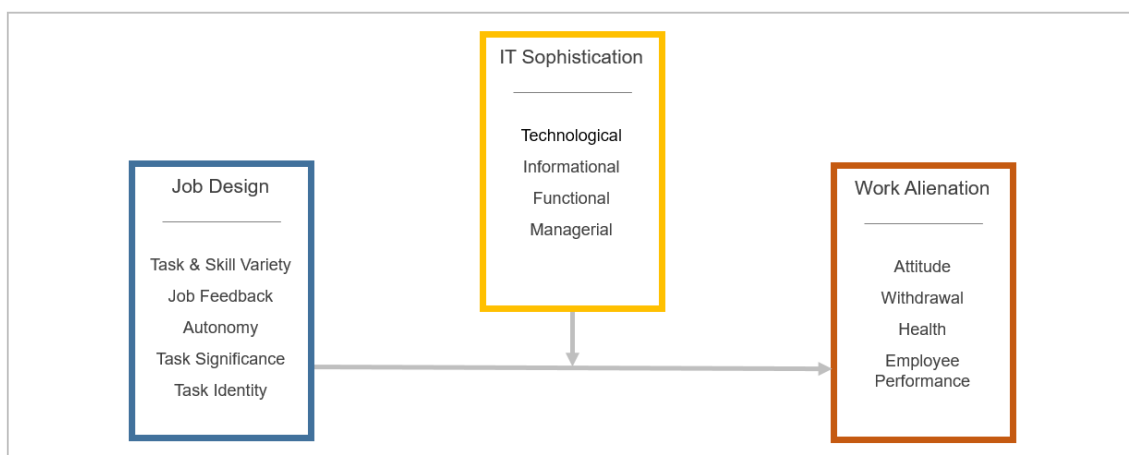
Figure 25:   Moderator role of information technology sophistication

It could therefore be concluded that information technology sophistication did moderate the relationship between the perceived job design and the perceived work alienation experienced by knowledge workers.

6.6. Discussion of findings related to Research Question 3

Research Question 3 aimed to confirm whether information technology sophistication impacts perceived work alienation experienced by knowledge workers working in contemporary financial services institutions.

Information technology sophistication was based on a multidimensional construct (Raymond & Paré, 1992) that grouped together the complex and highly interdependent components of information technology use and management.

6.6.1. The impact of information technology sophistication on work alienation

Analysis results revealed a small, but still significant, negative correlation between information technology sophistication and perceived work alienation. A variance of 8.526% in respondents' scores on the perceived work alienation scale could be attributed to perceived information technology sophistication. Knowledge workers would therefore experience lower levels of perceived work alienation with higher levels of perceived information technology sophistication.

The ability to predict levels of perceived work alienation by the information technology sophistication, work environment and job design constructs was subsequently tested by performing a standard multiple regression analysis (Pallant, 2010). The results of the regression analysis indicated that the three predictors collectively explained 31.00% of the variance in perceived work alienation, and that the result was statistically significant.

However, the unique contribution made by information technology sophistication was the weakest contribution made and was not considered to be a significant unique contribution (β = -0.016, $p<0.800$) to the prediction of the perceived work alienation, when the variance explained by all the other variables in the model was controlled for (Pallant, 2010). Information technology sophistication only uniquely described approximately 0.5% of the variance in the perceived work alienation scores (Tabachnick & Fidell, 2007).

Both the working environment variables, organisational support (β = 0.217, $p<0.01$) and the job design (β = 0.351, $p<0.01$), made a significant unique contribution to explaining the dependent variable, work alienation (Pallant, 2010). Organisational support uniquely described approximately 3.00% of the variance in the perceived work alienation scores, whilst job design uniquely described nearly 8% of the same variance (Tabachnick &

Fidell, 2007). The part correlation co-efficient values mentioned above only represent the unique contributions that each variable made to the total variance in perceived work alienation (Pallant, 2010).

6.6.2. Summary of results for Research Question 3

Due to a small, but still significant, negative correlation knowledge workers would experience lower levels of perceived work alienation with higher levels of perceived information technology sophistication. A variance of 8.526% in respondents' scores on the perceived work alienation scale could be attributed to perceived information technology sophistication. However, the same construct could only uniquely describe 0.5% of the variance in the perceived work alienation scores (β = -0.016), which is not significant.

The research study of Çetin et al. (2009) did not focus on IT sophistication specifically, but did find that the unique contribution of the technology factors in the studied financial services institutions was positive and higher (β = 0,068), but still insignificant. Their study showed that higher levels of the perceived technology precursor would result in higher levels of perceived work alienation.

Research Question 3 was confirmed that information technology sophistication does impact perceived work alienation experienced by knowledge workers working in contemporary financial services institutions.

6.7. Conclusion

Despite the generalisations that were made by researchers regarding the nature of technology, and specifically information technology, in a modern working environment, this research study confirmed that information technology sophistication does impact perceived work alienation experienced by knowledge workers working in contemporary financial services institutions.

7. Chapter Seven: Conclusion

At the time of the research study, the modern economy was not only in a state of crisis (Ivashina & Scharfstein, 2010); it was also in the process of transforming into a knowledge economy, characterised by the creation, evaluation and trading of knowledge in order to create economic wealth (Asongu, 2014; Tchamyou, 2015). The state of the knowledge economy was more volatile than ever experienced before, driven forward by an ever-increasing pace of disruptive innovation (Leon, 2011). Set against the backdrop of the worldwide economic transformation and deterioration, organisations like financial institutions and banks at the time experienced tremendous disruption that was stimulated by the increasing momentum of technology innovation, growing customer demands, regulatory pressure, and a host of other disruptors (Van Liedekerke & Dubbink, 2009).

Knowledge workers were considered to be the enablers through which organisations would achieve a sustainable competitive advantage (Leon, 2011). It was therefore essential for the sustainable development of any organisation to secure knowledge workers and to ensure their continued commitment to the organisation, as well as high productivity rates (Millar & Choi, 2010; Nair & Vohra, 2010). A critical threat to the knowledge worker's role as "key strategic and competitive" (Nair & Vohra, 2010, p. 600) resource was work alienation, which effectively disable the resources, leaving them in a state of detachment from their place of work, business processes and work deliverables (Shantz et al., 2015).

Despite the fact that knowledge workers were widely recognised as the most valuable assets of the 21st century organisation (Hendarman & Tjakraatmadja, 2012), financial service institutions were at the same time confronted with the ultimatum to transition to modern technology service provider models or face possible extinction (Hirt & Willmott, 2014). As knowledge organisations strive to provide for the knowledge workers' growing technology needs (Johns & Gratton, 2013) whilst also supporting their own increasingly sophisticated requirements, these organisations turn to information technology to provide wide-spread and comprehensive business solutions (Luftman et al., 2015). However, it was speculated that the same pervasive information technology solutions would also progressively challenge the knowledge worker's unique contribution in the modern working environment and job activities (Noor, 2015). Organisations and business at large have the option to implement varied degrees and combinations of modern and sophisticated information technology solutions to augment and improve conditions for their workers, or to replace the workers. The expected impact of information technology interventions is, however, of such a nature that it is estimated

that more than 100 million higher skilled jobs will be impacted over the next decade (Justice, 2015), therefore directly competing with the capabilities offered by the knowledge worker.

7.1. Principle findings

The objective with the research study was to gain a quantitative understanding of the impact of information technology sophistication on the perceived work alienation experienced by knowledge workers in a selection of contemporary financial services institutions. The study was exploratory in nature, directed by observations based on the research of recognised scholars in the field, such as Chiaburu et al. (2014), Nair and Vohra (2009, 2010 and 2012) and Shantz et al. (2015), supported by the reality of the real-world primary research data.

For the first time, it could be established that information technology sophistication does impact the perceived work alienation of knowledge workers. Information technology sophistication displayed a negative, yet statistically significant, relationship with perceived work alienation. Further, it was established that information technology sophistication also moderated the relationships between perceived work alienation and job design, as well as the knowledge worker's working environment. The strength of the relationships between perceived work alienation and the physical constructs were reduced in both instances.

7.2. Implications for management

Both the information technology sophistication and job design components can be controlled by the organisation, which is essential for planning the organisation's human resource strategy (Wöcke, Bendixen & Rijamampianina, 2007).

With information technology sophistication moderating the relationship between perceived work alienation and the knowledge worker's working environment, reducing the strength of the relationship. It was shown that the organisation's management has a moderating mechanism to improve the knowledge worker's perceived working environment by making use of a wide array of sophisticated information technology solutions. It was also shown that the organisation's management could employ information technology solutions to improve the knowledge worker's perceived job design.

7.3. Implications for academics

Contemporary management studies only seemed to offer limited research and insight into work alienation (Nair & Vohra, 2012; Shantz et al., 2015). It also seemed that the

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available academic material predominantly provided a generic approach to workers, incorporating manual and industrial workers, as well as knowledge workers into a singular construct despite their vastly different and distinguishing attributes (Chiaburu et al., 2014). This research focused on knowledge workers in the predominant knowledge industry of modern financial services institutions.

This study contributes to the wider application of perceived work alienation by knowledge workers by extending the working environment to that of contemporary financial services industries, as suggested by Nair and Vohra (2010). In contrast with the limitations expressed by Nair and Vohra (2010), the study also incorporates a more balanced sample through the representation of a balanced gender profile, as well as a wider diversity in age, appointment levels (junior to executive) and tenure.

Generalisations were made by researchers regarding the nature of technology in a modern working environment, specifically information technology. Researchers generally accepted the findings of Blauner (1964), as cited in Nair and Vohra (2012), broadly categorising technology as a work alienation predictor that contributes to the absence of meaningful work, as well as the limitation of worker autonomy (Nair & Vohra, 2012). This research study specifically focused on information technology sophistication as multi-dimensional construct and showed the statistically significant, but negative relationship with perceived work alienation.

The theoretical model of work alienation predictors and outcomes by Chiaburu et al. (2014) was also modified to incorporate technology (Vohra & Nair, 2010) as a working environment construct variable.

Figure 26: Precursors of work alienation, as experienced by knowledge workers
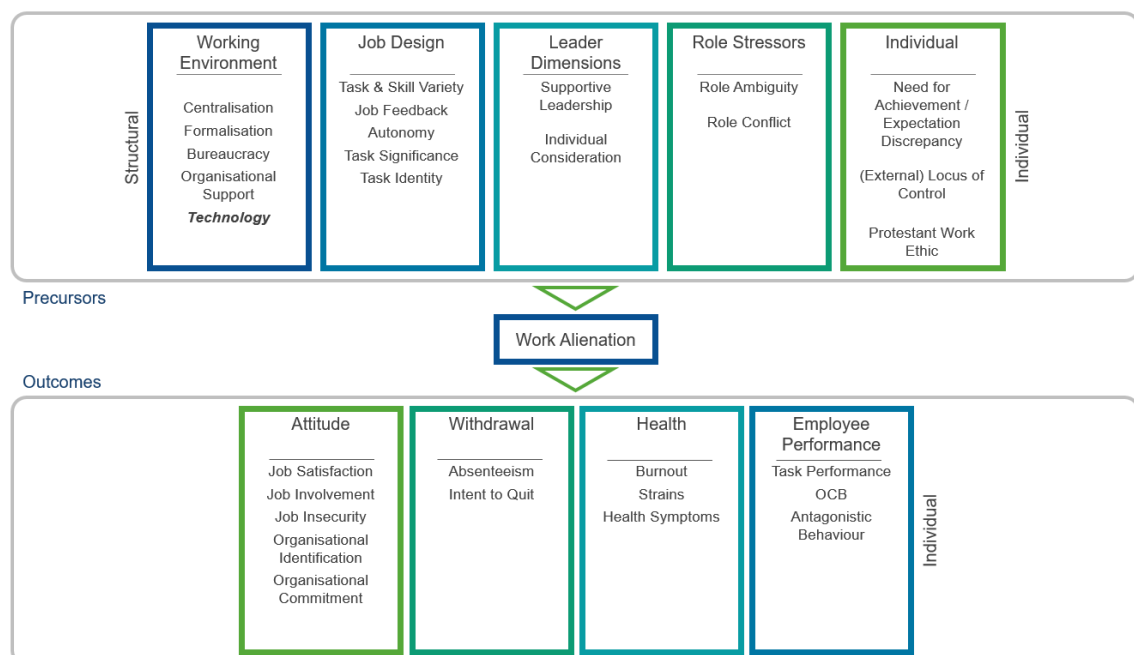
7.4. Research limitations and future studies

The research design and methodology selected for this study introduced a number of limitations, which may have materialised in the execution of the study. The non-probability, purposive sampling method that was implemented, was expected to exclude significant portions of the population, which may have resulted in an unrepresentative target population. Under such conditions, bias becomes a concern influencing the findings (Wegner, 2012). Additionally, it was impossible to sufficiently test the sampling error from the sample data, implying that it would not be valid to draw statistical inferences from the non-probability sample data (Wegner, 2012).

Non-response biases may also have been introduced where respondents did not complete the online survey due to time limitations or due to a possible misinterpretation of the qualifying question that was implemented to ensure that respondents were actively employed at financial service institutions. It was also the case that in some instances the targeted recipients were no longer employed at the identified financial institutions.

The researcher proposes that future studies should investigate whether information technology sophistication moderates the relationship between perceived work alienation and the leader dimensions, role stressors and individual characteristics precursors, as illustrated by Figure 28.

Figure 27:   Moderator role of information technology sophistication
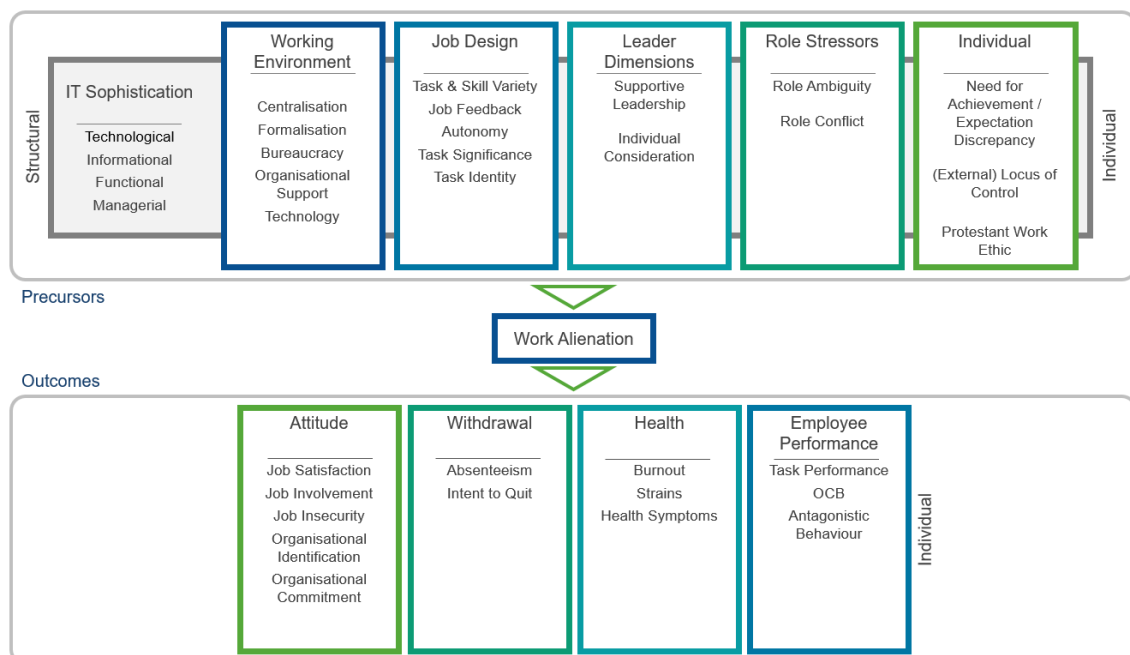
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9. Appendix A: Survey Questions

The following section details the survey that will be used for the research study. The survey questions will be grouped into two parts, which will represent the work alienation precursor information, as well as the demographic information.

Gordon Institute of Business Science
University of Pretoria

The Impact of Information Technology Sophistication on the
Work Alienation of Knowledge Workers

Dear Sir / Madam. I am conducting research on the role of cognitive computing as a precursor to the workplace alienation of knowledge workers. I aim to do this by conducting primary research in the form of a survey.

My survey contains a total of 40 questions and is expected to take no longer than 10 minutes to complete. The aim of the survey is to measure the relationship between the degree of computerisation and the respondent's working environment in order to better understand whether computerisation contributes to workplace alienation.

Your participation is voluntary and you can withdraw at any time without penalty. All data will be kept confidential. By completing the survey, you indicate that you voluntarily participate in this research.

If you have any concerns, please contact my supervisor or me. Our details are provided below.

Researcher: Fred Coetzee
Email: fred.coetzee@live.com
Phone: +27 (0) 82 376-0721

Research Supervisor: Albert Wöcke
Email: wockea@gibs.co.za

Part 1: Work alienation precursor information:

1. Are you permanently employed at a financial services organisation, or do you provide consulting / contracting services at a financial services organisation?

Yes	No
○	○

Working Environment

2. The organisation has a hierarchy of authority, responsible for planning and decision making

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

3. The job allows me to participate in decisions that will affect the organisation as a whole

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

4. The organisation provides direct and clear information that my contribution is valued

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

5. The job and its required activities are clearly specified

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

6. The job is governed by a complex set of rules, policies and procedures

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

7. The organisation closely monitors adherence to the rules, policies and procedures

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

8. The job allows me to plan how I do my work

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

9. The job allows me to make a lot of decisions on my own

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

10. The job allows me to decide on my own how to go about doing my work

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

11. The job requires the performance of a wide range of tasks

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

12. The work activities themselves provide direct and clear information about the effectiveness (e.g., quality and quantity) of my job performance

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

13. The results of my work are likely to significantly affect the lives of other people

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

14. The job involves completing a piece of work that has an obvious beginning and end

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

Information Technology Sophistication

15. The organisation uses a wide variety of sophisticated hardware, software, programming languages and data processing capabilities

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

16. The organisation uses a wide variety of transactional and administrative software systems, with high levels of integration and communication between the systems

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

17. The organisation has a dedicated IT department, through which mature IT processes are implemented by a variety of IT specialists

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

18. IT in the organisation is managed through mature processes that cover all management aspects, including strategy execution, funding and governance, to name but a few

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

19. Many processes in my job environment are computerised

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

20. Adherence to rules, policies and procedures applicable to my job are closely monitored by computerised systems

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

21. My job requires me to exchange a lot of information with computer systems

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

Work Experience (Work Alienation)

22. I do not enjoy my work

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

23. Facing my daily tasks is a painful and boring experience

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

24. Work to me is more like a chore or a burden

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

25. I feel estranged / disconnected from myself

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

26. I often wish I were doing something else

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

27. Over the years, I have become disillusioned about my work

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

28. I do not feel like putting in my best effort at work

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

29. I do not feel connected to the events in my workplace

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

Knowledge Characteristics

30. The job involves performing relatively complicated tasks

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

31. The job requires me to analyse a lot of information

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

32. The job involves solving problems that have no obvious correct answer

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

33. The job requires me to use a variety of complex or high-level skills

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

34. The job requires very specialized knowledge and skills

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○	○

Part 2: Demographic information:

Tell us a bit more about yourself

35. What is your age?

	Under 18	18 - 29	30 - 44	45 - 59	60+
	○	○	○	○	○

36. What is your gender?

	Male	Female	Other
	○	○	○

37. What is your race? Select the appropriate option.

	African	Coloured	Indian / Asian	White / Caucasian	Multiple Ethnicity / Other
	○	○	○	○	○

38. What is your length in service at current employer (in years)? Select the appropriate option.

	2 Years or less	3 to 5 Years	6 to 10 Years	11 to 15 Years	16 or more Years
	○	○	○	○	○

39. What is your appointment level in the organisation? Select the appropriate option.

Trainee	Assistant	Junior	Senior	Lead	Manager	Director	Executive
○	○	○	○	○	○	○	○

40. What is your highest qualification? Select the appropriate option.

	No high school	High school graduate	Tertiary diploma or equivalent	3-Year degree	4-Year degree	Post-graduate degree
	○	○	○	○	○	○

10. Appendix B: Statistical analysis details

10.1. Demographic influences on perceived work alienation

The influence of demographics on the perceived work alienation experienced by the knowledge worker was measured by performing a Kruskal-Wallis test, which is the non-parametric test that allows a categorical independent demographic variable with three or more categories to be tested against the dependent variable Work Alienation (Pallant, 2010), controlling for each demographic variable. The results per demographic variable are indicated in Table 18 below. Results where the tests indicated significant differences were highlighted and indicated in bold font.

Table 18:   Demographic influences on perceived work alienation

Construct	χ2	df	p	n	Min Mean Rank	Max Mean Rank
Age	3.753	3	0.289	216	98.72	115.38
Gender	0.001	1	0.971	216	108.34	108.64
Ethnicity	3.263	4	0.515	216	96.83	124.44
Education	5.477	4	0.242	216	99.00	127.94
Tenure	***11.512**	**4**	**0.021**	**216**	**89.09**	**125.62**
Appointment Level	11.742	6	0.068	216	58.75	143.70

* Correlation was significant at the 0.05 level (2-tailed).   ** Correlation was significant at the 0.01 level (2-tailed).

The Kruskal-Wallis Test for Tenure revealed a statistically significant difference in work alienation levels experienced across the five different tenure groups, with $p < 0.05$ (Pallant, 2010). The tenure groups (Gp1, n = 43: 2 Years or less, Gp2, n = 60: 3 to 5 years, Gp3, n = 39: 6 to 10 years, Gp4, n = 16: 11 to 15 years, Gp5, n = 58: 16 Years or more), χ2 (4, n = 216) = 11.512, p = 0.021. The 11 to 15 years group recorded the highest work alienation scores with a Mean Rank value of 122.34, whilst the lowest work alienation scores were recorded by the tenure group 16 years or more

None of the remaining demographic variables displayed a statistically significant difference in work alienation levels experienced across the variable groups.

The Kruskal-Wallis Test revealed no statistically significant difference for the Age construct in work alienation levels experienced across the five different age groups. The age group 30 to 44 years recorded the highest work alienation scores with a Mean Rank value of 114.08, followed by the age group 18 to 29 years. The lowest work alienation scores were recorded by the age group 45 to 59 years.

For Gender, the Kruskal-Wallis Test also revealed no statistically significant difference in work alienation levels experienced across the three different gender groups (Gp1, n = 116: Male, Gp2, n = 100: Female, Gp3, n = 0: Other), $\chi2$ (1, n = 216) = 0.002, p = 0.968. The Male group recorded the highest work alienation scores with a Mean Rank value of 108.66.

As with the previous two tests, the Kruskal-Wallis Test also revealed no statistically significant difference in work alienation levels experienced across the five different ethnicity groups (Gp1, n = 31: African, Gp2, n = 16: Coloured, Gp3, n = 26: Indian / Asian, Gp4, n = 141: White / Caucasian, Gp5, n = 2: Multiple Ethnicity / Other,), $\chi2$ (4, n = 216) = 2.355, p = 0.671. However, the African group recorded the highest work alienation scores with a Mean Rank value of 120.77, followed by the Coloured group with a Mean Rank value of 115.22. The lowest work alienation scores were recorded by the Indian / Asian group.

For Education, the Kruskal-Wallis Test again revealed no statistically significant difference in work alienation levels experienced across the six different education level groups (Gp1, n = 0: No high school, Gp2, n = 25: High School, Gp3, n = 61: Tertiary Diploma, Gp4, n = 40: 3-Year degree, Gp5, n = 28: 4-Year degree, Gp6, n = 62: Post-graduate degree), $\chi2$ (4, n = 216) = 4.769, p = 0.312. The High School group recorded the highest work alienation scores with a Mean Rank value of 127.94, followed by the Post-graduate group with a Mean Rank value of 114.76. The lowest work alienation scores were recorded by the 4-Year degree group.

The Kruskal-Wallis Test for Appointment Level revealed no statistically significant difference in work alienation levels experienced across the eight different appointment level groups (Gp1, n = 0: Trainee, Gp2, n = 2: Assistant, Gp3, n = 15: Junior, Gp4, n = 52: Senior, Gp5, n = 28: Lead, Gp6, n = 107: Manager, Gp7, n = 7: Director, Gp8, n = 5: Executive), $\chi2$ (6, n = 216) = 10.531, p = 0.104. The Junior group recorded the highest work alienation scores with a Mean Rank value of 145.83, followed by the Senior group with a Mean Rank value of 115.70. The lowest work alienation scores were recorded by the Assistant group, followed by the Executive group.

10.2. Partial correlation analyses details for Research Question 2

10.2.1. Work Alienation and WE1 centralisation

Correlations

Control Variables			WA Perceived Work Alienation	WE1 The organisation has a hierarchy of authority, responsible for planning and decision making	IT Information Technology Sophistication
-none-[a]	WA Perceived Work Alienation	Correlation	1.000	-.185	-.297
		Significance (2-tailed)	.	.006	.000
		df	0	214	214
	WE1 The organisation has a hierarchy of authority, responsible for planning and decision making	Correlation	-.185	1.000	.159
		Significance (2-tailed)	.006	.	.019
		df	214	0	214
	IT Information Technology Sophistication	Correlation	-.297	.159	1.000
		Significance (2-tailed)	.000	.019	.
		df	214	214	0
IT Information Technology Sophistication	WA Perceived Work Alienation	Correlation	1.000	-.146	
		Significance (2-tailed)	.	.032	
		df	0	213	
	WE1 The organisation has a hierarchy of authority, responsible for planning and decision making	Correlation	-.146	1.000	
		Significance (2-tailed)	.032	.	
		df	213	0	

a. Cells contain zero-order (Pearson) correlations.

10.2.2. Work Alienation and WE1 formalisation

Correlations

Control Variables			WA Perceived Work Alienation	WE1 The organisation closely monitors adherence to the rules, policies and procedures	IT Information Technology Sophistication
-none-[a]	WA Perceived Work Alienation	Correlation	1.000	-.168	-.297
		Significance (2-tailed)	.	.013	.000
		df	0	214	214
	WE1 The organisation closely monitors adherence to the rules, policies and procedures	Correlation	-.168	1.000	.418
		Significance (2-tailed)	.013	.	.000
		df	214	0	214
	IT Information Technology Sophistication	Correlation	-.297	.418	1.000
		Significance (2-tailed)	.000	.000	.
		df	214	214	0
IT Information Technology Sophistication	WA Perceived Work Alienation	Correlation	1.000	-.051	
		Significance (2-tailed)	.	.459	
		df	0	213	
	WE1 The organisation closely monitors adherence to the rules, policies and procedures	Correlation	-.051	1.000	
		Significance (2-tailed)	.459	.	
		df	213	0	

a. Cells contain zero-order (Pearson) correlations.

10.2.3. Work Alienation and WE1 bureaucracy

Correlations

Control Variables				WA Perceived Work Alienation	WE1 The job is governed by a complex set of rules, policies and procedures	IT Information Technology Sophistication
-none-[a]	WA Perceived Work Alienation	Correlation		1.000	-.008	-.297
		Significance (2-tailed)		.	.906	.000
		df		0	214	214
	WE1 The job is governed by a complex set of rules, policies and procedures	Correlation		-.008	1.000	.197
		Significance (2-tailed)		.906	.	.004
		df		214	0	214
	IT Information Technology Sophistication	Correlation		-.297	.197	1.000
		Significance (2-tailed)		.000	.004	.
		df		214	214	0
IT Information Technology Sophistication	WA Perceived Work Alienation	Correlation		1.000	.054	
		Significance (2-tailed)		.	.430	
		df		0	213	
	WE1 The job is governed by a complex set of rules, policies and procedures	Correlation		.054	1.000	
		Significance (2-tailed)		.430	.	
		df		213	0	

a. Cells contain zero-order (Pearson) correlations.

10.2.4. Work Alienation and WE2 organisational support

Correlations

Control Variables			WA Perceived Work Alienation	WE2 The job allows me to participate in decisions that will affect the organisation as a whole	IT Information Technology Sophistication
-none-[a]	WA Perceived Work Alienation	Correlation	1.000	.425	-.297
		Significance (2-tailed)	.	.000	.000
		df	0	214	214
	WE2 The job allows me to participate in decisions that will affect the organisation as a whole	Correlation	.425	1.000	-.247
		Significance (2-tailed)	.000	.	.000
		df	214	0	214
	IT Information Technology Sophistication	Correlation	-.297	-.247	1.000
		Significance (2-tailed)	.000	.000	.
		df	214	214	0
IT Information Technology Sophistication	WA Perceived Work Alienation	Correlation	1.000	.380	
		Significance (2-tailed)	.	.000	
		df	0	213	
	WE2 The job allows me to participate in decisions that will affect the organisation as a whole	Correlation	.380	1.000	
		Significance (2-tailed)	.000	.	
		df	213	0	

a. Cells contain zero-order (Pearson) correlations.

10.2.5. Work Alienation and job design

Correlations

Control Variables			WA Perceived Work Alienation	JD Job Design	IT Information Technology Sophistication
-none-[a]	WA Perceived Work Alienation	Correlation	1.000	.509	-.297
		Significance (2-tailed)	.	.000	.000
		df	0	214	214
	JD Job Design	Correlation	.509	1.000	-.446
		Significance (2-tailed)	.000	.	.000
		df	214	0	214
	IT Information Technology Sophistication	Correlation	-.297	-.446	1.000
		Significance (2-tailed)	.000	.000	.
		df	214	214	0
IT Information Technology Sophistication	WA Perceived Work Alienation	Correlation	1.000	.440	
		Significance (2-tailed)	.	.000	
		df	0	213	
	JD Job Design	Correlation	.440	1.000	
		Significance (2-tailed)	.000	.	
		df	213	0	

a. Cells contain zero-order (Pearson) correlations.

10.3. Multiple regression details for Research Question 3

Correlations

		WA Perceived Work Alienation	WE1.1 The organisation has a hierarchy of authority, responsible for planning and decision making	WE1.2 The organisation closely monitors adherence to the rules, policies and procedures	WE1.3 The job is governed by a complex set of rules, policies and procedures	WE2.1 The job allows me to participate in decisions that will affect the organisation as a whole	JD Job Design	IT Information Technology Sophistication
Pearson Correlation	WA Perceived Work Alienation	1.000	-.185	-.168	-.008	.425	-.509	-.297
	WE1.1 The organisation has a hierarchy of authority, responsible for planning and decision making	-.185	1.000	.065	-.038	-.178	.168	.159
	WE1.2 The organisation closely monitors adherence to the rules, policies and procedures	-.168	.065	1.000	.405	-.263	.268	.418
	WE1.3 The job is governed by a complex set of rules, policies and procedures	-.008	-.038	.405	1.000	-.128	.085	.197
	WE2.1 The job allows me to participate in decisions that will affect the organisation as a whole	.425	-.178	-.263	-.128	1.000	-.517	-.247
	JD Job Design	-.509	.168	.268	.085	-.517	1.000	.446
	IT Information Technology Sophistication	-.297	.159	.418	.197	-.247	.446	1.000
Sig. (1-tailed)	WA Perceived Work Alienation	.	.003	.007	.453	.000	.000	.000
	WE1.1 The organisation has a hierarchy of authority, responsible for planning and decision making	.003	.	.170	.290	.004	.007	.010
	WE1.2 The organisation closely monitors adherence to the rules, policies and procedures	.007	.170	.	.000	.000	.000	.000
	WE1.3 The job is governed by a complex set of rules, policies and procedures	.453	.290	.000	.	.030	.107	.002
	WE2.1 The job allows me to participate in decisions that will affect the organisation as a whole	.000	.004	.000	.030	.	.000	.000
	JD Job Design	.000	.007	.000	.107	.000	.	.000
	IT Information Technology Sophistication	.000	.010	.000	.002	.000	.000	.
N	WA Perceived Work Alienation	216	216	216	216	216	216	216
	WE1.1 The organisation has a hierarchy of authority, responsible for planning and decision making	216	216	216	216	216	216	216
	WE1.2 The organisation closely monitors adherence to the rules, policies and procedures	216	216	216	216	216	216	216
	WE1.3 The job is governed by a complex set of rules, policies and procedures	216	216	216	216	216	216	216
	WE2.1 The job allows me to participate in decisions that will affect the organisation as a whole	216	216	216	216	216	216	216
	JD Job Design	216	216	216	216	216	216	216
	IT Information Technology Sophistication	216	216	216	216	216	216	216

Test for Multicollinearity only revealed a low level for the WE1 variable of 0.185 (Pallant, 2010). All the Toelrance values were above 0.10, therefore no high multiple correlations with other variables, whilst all the VIF results were well below 10, as suggested by Pallant (2010).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	5.878	.885		6.640	.000	4.133	7.623					
	WE1.1 The organisation has a hierarchy of authority, responsible for planning and decision making	-.059	.049	-.071	-1.202	.231	-.156	.038	-.185	-.083	-.069	.945	1.058
	WE1.2 The organisation closely monitors adherence to the rules, policies and procedures	-.002	.082	-.002	-.029	.977	-.163	.159	-.168	-.002	-.002	.697	1.435
	WE1.3 The job is governed by a complex set of rules, policies and procedures	.066	.065	.065	1.029	.305	-.061	.194	-.008	.071	.059	.827	1.209
	WE2.1 The job allows me to participate in decisions that will affect the organisation as a whole	.194	.061	.217	3.171	.002	.073	.315	.425	.214	.182	.705	1.419
	JD Job Design	-.594	.124	-.351	-4.810	.000	-.838	-.351	-.509	-.316	-.276	.622	1.608
	IT Information Technology Sophistication	-.116	.091	-.088	-1.281	.202	-.295	.063	-.297	-.088	-.074	.695	1.438

a. Dependent Variable: WA Perceived Work Alienation

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.06044	5.35943	2.60185	.813952	216
Std. Predicted Value	-1.894	3.388	.000	1.000	216
Standard Error of Predicted Value	.106	.461	.210	.072	216
Adjusted Predicted Value	1.06358	5.29352	2.60241	.814438	216
Residual	-2.677318	3.767060	.000000	1.214865	216
Std. Residual	-2.173	3.057	.000	.986	216
Stud. Residual	-2.248	3.122	.000	1.004	216
Deleted Residual	-2.866250	3.928825	-.000562	1.259917	216
Stud. Deleted Residual	-2.270	3.190	.002	1.010	216
Mahal. Distance	.585	29.037	5.972	4.740	216
Cook's Distance	.000	.075	.005	.011	216
Centered Leverage Value	.003	.135	.028	.022	216

a. Dependent Variable: WA Perceived Work Alienation

The Mahalanobis distance value of 29.037 in the Residuals Statistics table above the proposed limit of 22.46 for 6 variables (Pallant, 2010)., indicating the presence of some outliers.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.557[a]	.310	.290	1.232180

a. Predictors: (Constant), IT Information Technology Sophistication, WE1.1 The organisation has a hierarchy of authority, responsible for planning and decision making, WE1.3 The job is governed by a complex set of rules, policies and procedures, WE2.1 The job allows me to participate in decisions that will affect the organisation as a whole, WE1.2 The organisation closely monitors adherence to the rules, policies and procedures, JD Job Design

b. Dependent Variable: WA Perceived Work Alienation

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	142.441	6	23.740	15.636	.000[b]
	Residual	317.318	209	1.518		
	Total	459.759	215			

a. Dependent Variable: WA Perceived Work Alienation

b. Predictors: (Constant), IT Information Technology Sophistication, WE1.1 The organisation has a hierarchy of authority, responsible for planning and decision making, WE1.3 The job is governed by a complex set of rules, policies and procedures, WE2.1 The job allows me to participate in decisions that will affect the organisation as a whole, WE1.2 The organisation closely monitors adherence to the rules, policies and procedures, JD Job Design

11. Appendix C: Ethical Clearance

A-106

Dear Mr Frederik Coetzee

Protocol Number: **Temp2016-02032**

Title: **The Role of Cognitive Computing as a Precursor to the Work Alienation of the Knowledge Worker**

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

You are therefore allowed to continue collecting your data.

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

Kind Regards,

Adele Bekker

12. Turnitin Report